WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 3rd Semester Examination, 2022-23

CEMACOR07T-CHEMISTRY (CC7)

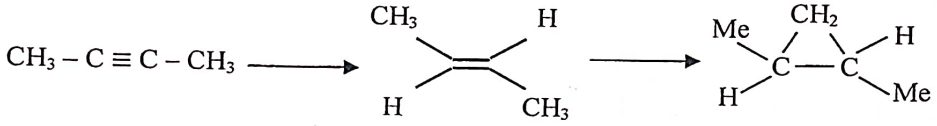
Time Allotted: 2 Hours | Full Marks: 40

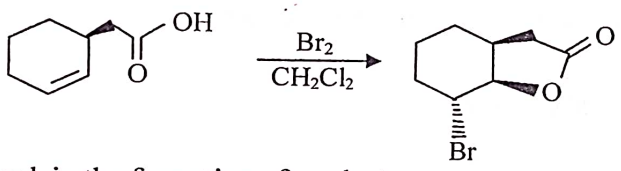
The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

Answer any *four* questions taking *one* from each unit

UNIT-I

1. (a) Give appropriate reagents to carry out the following transformation and explain your answer. 3



(b) 

2

Explain the formation of product.

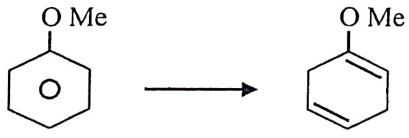
(c) Carry out the following conversion: 2

(i) *Z*-2-butene to *E*-2-butene.

(d) Write the structures of the ozonides formed when 2,3-dimethyl-2-butene was subjected to ozonolysis in the presence of HCHO. Give the mechanism for ozonide formation. 3

2. (a) How can you carry out the following transformations? 2+2

(i) $H_3C-C\equiv C-CH_3 \longrightarrow H_3C-CH_2-C\equiv CH$

(ii) 

(b) Transform $1\frac{1}{2}+1\frac{1}{2}$

(i) $CH_3-CH_2-C\equiv CH \longrightarrow CH_3\,CH_2\,CH_2\,CHO$

(ii) 

(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

UNIT-II

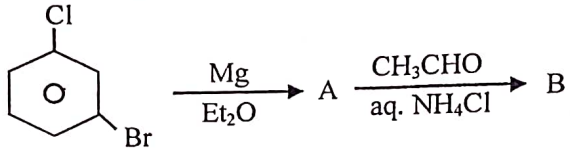
3. Answer any ***three*** from the following: 2×3 = 6

(a) When benzene is separately treated with $Me_3C–CH_2Cl$ and $Me_2CH–CH(Cl)CH_3$ in the presence of anhydrous $AlCl_3$, same product is obtained. Identify the products with proper explanation.

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

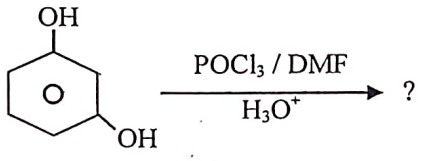
(c) Acetanilide readily decolorizes bromine colour when treated with Br_2/AcOH solution though it does not contain any olefinic unsaturation. Justify.

(d) Identify compounds A and B in the following sequence of reactions and suggest mechanism of their formation

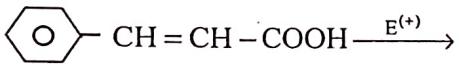


4. Answer any ***three*** from the following: 2×3 = 6

(a) Write down the product of the following reaction with mechanism.

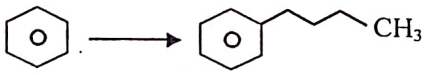


(b) Mention the proper position of $E^{(+)}$ in the product of the following reactions

(i) 

(ii) 

(c) Suggest the most suitable method for the following conversion.

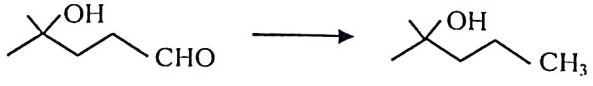


(d) Rationalize the fact with suitable mechanism that nitration of 4-^{t}butyl toluene gives 4-nitro toluene as one of the products.

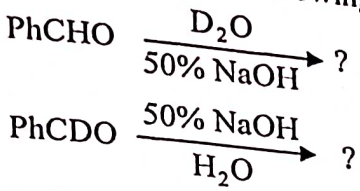
UNIT-III

5. (a) Carry out the following transformation and explain. 2+2

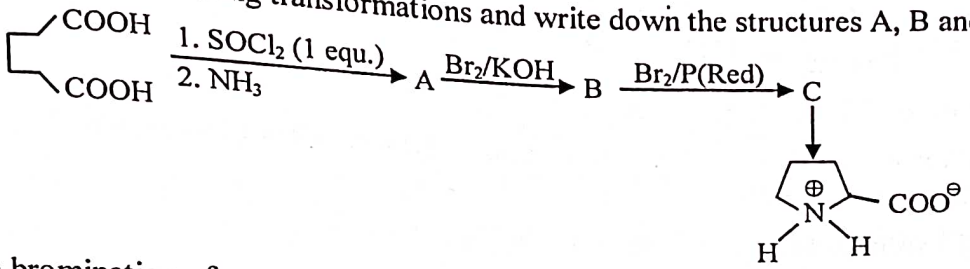
(i) 

(ii) 

(b) Predict product(s) for the following reaction 3



(c) Complete the following transformations and write down the structures A, B and C. 3

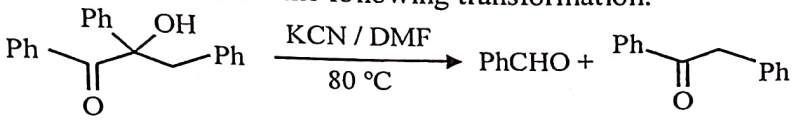


(d) The bromination of acetone is catalysed by acids and it is zero order with respect to bromine. Discuss. 2

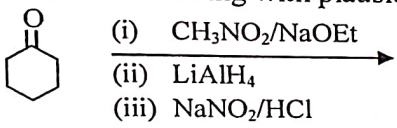
(e) Define atom economy. Give example. 2

(f) What product(s) are obtained when benzaldehyde is treated with propanoic anhydride and sodium propanoate? Give mechanism of the reaction. 2

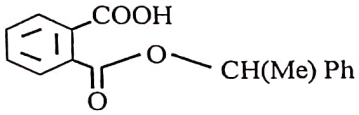
(g) Suggest a suitable mechanism for the following transformation. 2



6. (a) Predict the product in the following with plausible explanation. 2

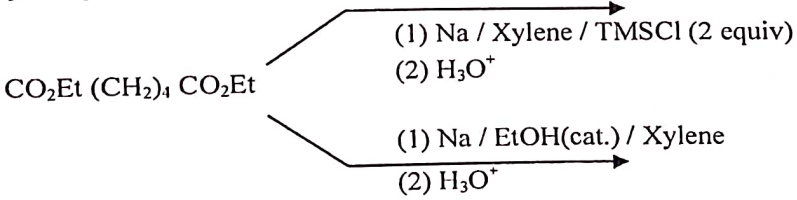


(b) The compound (A) in the following, on hydrolysis, yields (±) 1-phenylethanol. Explain. 2



(A) (+)-form

(c) Identify the products in the following reaction and explain $1\frac{1}{2}+1\frac{1}{2}$

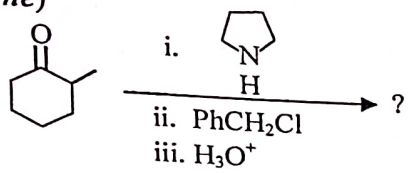


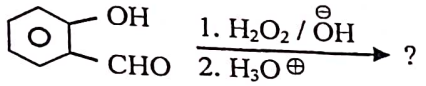
(d) Carry out the following conversions mentioning proper reaction conditions and reagents along with plausible mechanism. 2+2

(i) 

(ii) Acetophenone ⟶ phenylvinyl ketone

(e) Predict the major product of the following reaction and explain why it is major one (any *one*) 3

(i) 

(ii) 

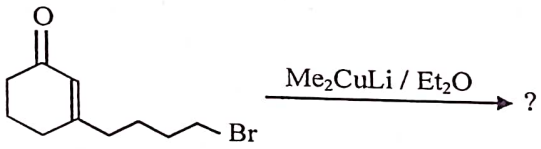
(f) Explain the following statements. 2+2

(i) Semicarbazide hydrochloride does not react with a ketone alone unless sodium acetate is mixed.

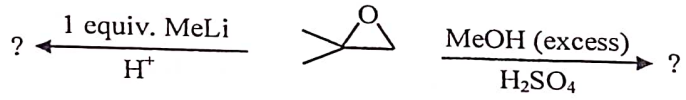
(ii) Chloral is obtained in hydrated form only. Explain.

UNIT-IV

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



(b) Predict the product with plausible mechanism in each of the following reactions: 2



(c) How would you synthesize the following compound with the help of Reformatsky reaction? 2

$$PhC(Me) = C(Me)\,COOH.$$

8. (a) What happens when diisopropyl ketone is allowed to react with $(i-Pr)_2MgBr$? Give mechanism. Do you expect the same product if diisopropyl ketone is allowed to react with $(i-Pr)_2CHLi$? 3

(b) On treatment with Mg in dry ether, allyl-bromide gives hexa-1,5-diene whereas ^{n}propyl bromide forms corresponding Grignard reagent — Justify. $1\frac{1}{2}$

(c) Carry out the following transformation. $1\frac{1}{2}$

$$\text{Acetone} \longrightarrow Me_2C(OH) - CH_2OH$$

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