B.Sc. 3rd Semester (Honours) Examination, 2023 (CBCS)

Subject : Chemistry

Paper : CC-VII

(Organic Chemistry-III)

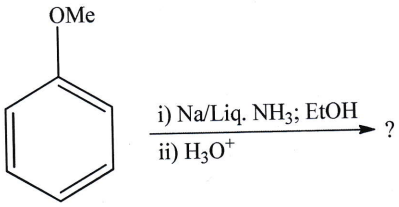
Time: 2 Hours **Full Marks: 40**

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer *any five* questions: 2×5=10

(a) Identify the product with mechanism:



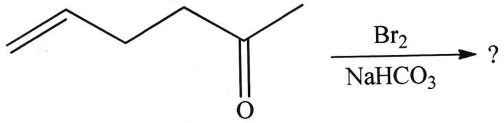
(b) Why does Chloral exist normally as a chloral hydrate?

(c) Why dry ether is used in preparation of Grignard Reagent?

(d) Which of the following esters undergo the Dieckmann condensation readily under usual condition? Give the product.
Adipate and Glutarate.

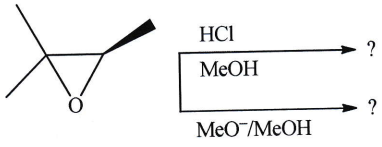
(e) $Ph_3P^{\oplus}-\!\!-C^{\ominus}Ph_2$ does not react with carbonyl compounds.—Explain.

(f) Give the mechanism of the following:



(g) Why are per acids not used in the epoxidation of α, β-unsaturated ketone?

(h) Identify the products with explanation:

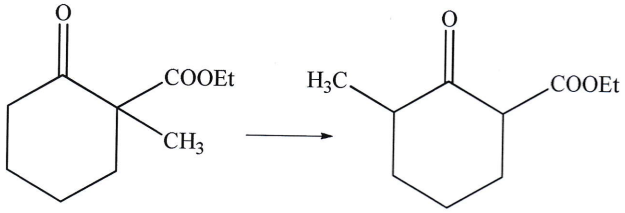


2. Answer *any two* questions: 5×2=10

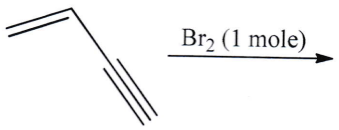
(a) (i) Starting from $PhCH{=}CH_2$ how will you synthesise α-phenylethyl alcohol and β-phenylethyl alcohol? 3

(ii) $CH_3CHO + HCHO$ (excess) $\xrightarrow{dil\ ^-OH}$? 2

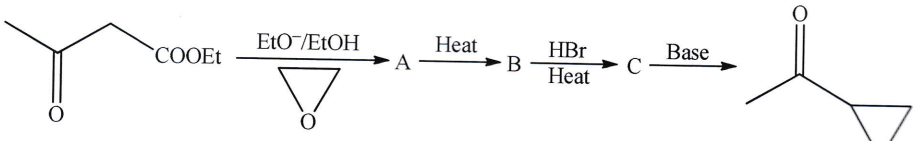
(b) (i) How would you convert: 2



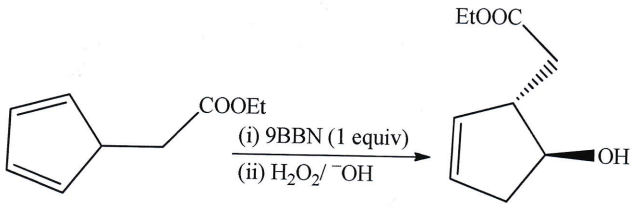
(ii) Butanone on bromination in presence of NaOH produces $CH_3CH_2COCBr_3$ whereas in acetic acid medium the major product is $CH_3CH(Br)COCH_3$. Explain with mechanistic details. 3

(c) (i) Predict the product  $\xrightarrow{Br_2\ (1\ mole)}$ 1

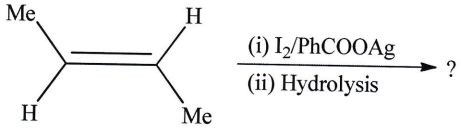
(ii) Identify A, B and C with mechanistic details: 4



(d) (i) Give the reaction mechanism: 2

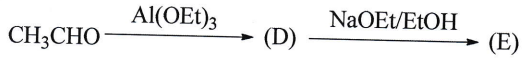


(ii) Identify the product. Will it be optically active? 3

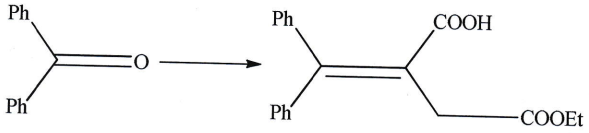


3. Answer *any two* questions: 10×2=20

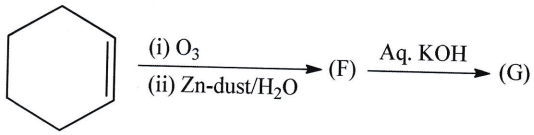
(a) (i) Identify the products and show the mechanism of the conversion from CH_3CHO to (D): 3



(ii) Write the plausible mechanism of the following conversion: 3

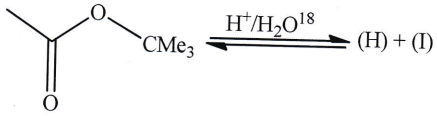


(iii) Identify the products in the following reaction sequence. 2



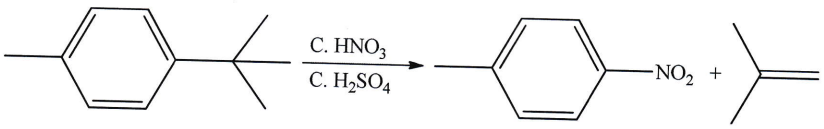
(iv) How would you protect an aldehyde using 1, 3-propane dithiol? Inversion of polarity occurs here at the carbonyl carbon while the corresponding oxyacetal does not show such effect. Why? 2

(b) (i) Identify the products with mechanism: 2

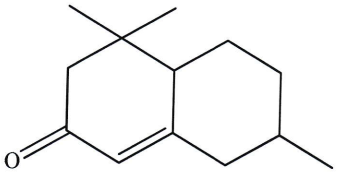


(ii) Nitration of anisole with the conventional nitrating mixture gives ortho-and para-nitroanisole in the ratio of 31 : 67 whereas the same reaction when carried out with N_2O_5 (HNO_3–Ac_2O) give $o : p = 71 : 28$. Explain the observation with plausible mechanism in each case. 3

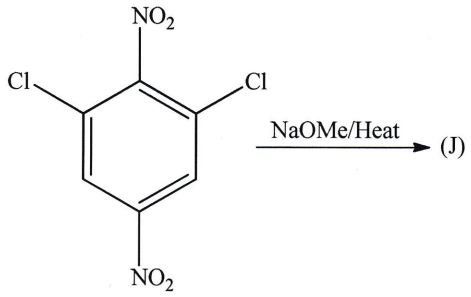
(iii) Give the mechanism of the following: 2



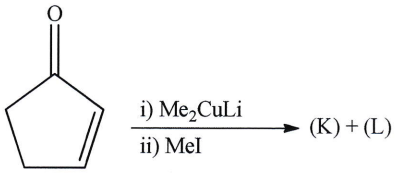
(iv) How would you synthesise the following compound from 3-methyl cyclohexanone? 3



(c) (i) 2

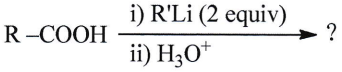


(ii) Comment on the major product: 3



(iii) $:C(OMe)_2$ is called an inert carbene while $:C(NH_2)_2$ is nucleophile.—Explain. 3

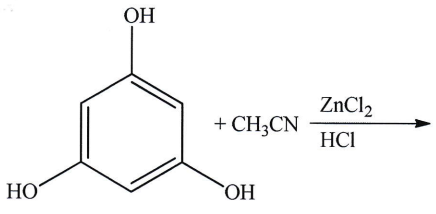
(iv) Give the product with mechanism: 2



(d) (i) Reaction between PhCHO and $CH_3COCH_2CH_3$ gives $PhCH{=}CHCOCH_2CH_3$ in base and $PhCH{=}C(CH_3)COCH_3$ in acid. Give explanation. 3

(ii) 3-hydroxybenzaldehyde undergoes Cannizzaro reaction but 2-hydroxy and 4-hydroxybenzaldehyde fail to react. Explain. 2

(iii) Predict the product with mechanism: 2



(iv) Explain the following: 3

Both $PhCH_2COCH_2Cl$ and $PhCH(Cl)COCH_3$ form $PhCH_2CH_2COOH$ when treated with ^-OH followed by acidification.