Ex/SC/CHEM/UG/CORE/TH/06/2024

B. Sc. CHEMISTRY EXAMINATION, 2024

(3rd Semester)

CHEMISTRY (CORE)

PAPER: CORE/CHEM/TH/06

Time: Two Hours Full Marks: 40

(20 marks for each Unit)

Use a separate answerscript for each unit.

UNIT-3061 - O

1. (a) Carry out the following transformations:

$$(i) \qquad \stackrel{\text{NH}_2}{\longleftarrow} \text{NO}_2$$

$$(ii) \longrightarrow \underbrace{ \begin{cases} l_{int} H \\ l_{int} H \end{cases}}_{int} OH$$

 1×2

(b) Predict the products of the following reactions with plausible mechanism: $1\times 2=2$

(i)
$$D$$

$$ENH_2$$

$$Liq. NH_3$$

$$-33 °C$$

(ii)
$$\begin{array}{c} Br \\ \hline D \\ \hline Liq. NH_3 \\ \hline -33 \text{ }^{\circ}C \end{array}$$

(c) Predict the major product in the following reaction with suitable explanation: 1½

(d) Compare the rates of bromination of the following alkenes with suitable explanation: 1½

(e) How will you utilize S_N^2 Ar reaction for the determination of N-terminal amino acid of a peptide chain? 1½

(7)

- (b) CO_2Et (a) Na, Toluene CO_2Et (b) H_3O^+
- $(c) \qquad \begin{array}{c} O \\ H_2C \stackrel{\bigcirc}{-} S \stackrel{\bigcirc}{-} CH_3 \\ CH_3 \end{array} \rightarrow$
- (d) $PhCH_2ONa (Cat.) \longrightarrow 60 °C$
- **9.** Carry out the following conversion through a thioacetal intermediate:

$$H_3C$$
 H_3C
 CO_2Et

5. Write down the proper reagents required in the following transformation:

n
Bu CHO \longrightarrow n Bu CH₃

- 6. How would you identify the presence of an aldehyde group in an organic compound? Write all the chemical reactions involved in that.
- 7. Predict the product of the following reaction with stereochemistry. Draw the reacting conformation of the substrate according to the Felkin-Ahn model and show only the trajectory for the nucleophilic attack to the carbonyl functional group.

$$H_3C$$
 H
 Ph

(a) MeLi, Et₂O
(b) Aq. work up

8. Predict the major product of the following reactions (Mechanism is not required): 1×4

(a)
$$(a)$$
 (a) TiCl₃, Li, DMF, reflux (b) work up

CHEM-9 [Continued]

(3)

(f) Predict the major product in the following Friedel-Crafts acylation reactions with suitable explanation: 1½

$$\frac{\text{CH}_{3}\text{COCl / anhyd AlCl}_{3}}{\text{CS}_{2}}$$

and

2. (a) Predict the products of the following reactions and draw the plausible mechanism in each case (any two): 2×2

(i)
$$Me$$
 O $KOH / EtOH$

(ii)
$$\begin{array}{c} \text{Me} \\ \text{H}^{\text{Hum}} \\ \text{Br} \end{array} \xrightarrow{\begin{array}{c} \text{Ph}_2\text{CuLi} \\ \text{THF} \\ -78 \text{ °C} \end{array}}$$

(iii)
$$OEt$$
 $PhCHO$
DABCO, CH_2Cl_2

CHEM-9

[Turn Over]

(b) How would you carry out following transformations? (Answer *any two*. Mechanism is not required)

 $1\frac{1}{2} \times 2$

[Continued]

$$(i) \qquad \begin{array}{c} \text{OMe} & \text{OMe} \\ \text{OMe} & \text{OMe} \\ \end{array}$$

$$(ii) \quad Ph - \longrightarrow Ph \longrightarrow Ph - Ph$$

$$(iii) \qquad \bigcap_{\text{O} \text{Ph}}$$

(c) Predict the product(s) of the following reactions and mechanistically explain the formation of products with proper reasoning.

CHEM-9

(5) UNIT—3062 – O

- 3. Answer *any two* of the following questions:
 - (a) Prove that Favorskii reaction proceeds through cyclopropanone intermediate.

 $2\frac{1}{2} \times 2$

- (b) Explain the role of dimethyl sulfoxide in Swern oxidation.
- (c) In case of enolization of the ketone RCOCH₂CH₃ using LDA, the nature of R-group largely affects the stereoselectivity of the enolates. Give suitable explanation in support of this statement.
- **4.** Write down the product of the following reactions with probable mechanism (*any two*): 2×2

(a)
$$\xrightarrow{\text{PCC, CH}_2\text{Cl}_2}$$
?

(b)
$$\frac{O}{CH_2 = O, HCl} \xrightarrow{1. Mel} ?$$

(c)
$$CO_2Et$$
 + $R_2C = O \xrightarrow{NaOEt}$?

CHEM-**9** [Turn Over]