

**2023**

**Time - 3 hours**

**Full Marks - 60**

*Answer all groups as per instructions.*

*Figures in the right hand margin indicate marks.*

**GROUP - A**

1. Answer all questions and fill in the blanks as required. [1 × 8]
- (a) Which of the twelve principles of Green Chemistry suggests to minimize the potential for accident ?
- (b) Between catalytic reagents and stoichiometric reagents, which are considered to be superior ?
- (c) Cyclopropanation of olefins with  $\text{CH}_2\text{I}_2 / \text{Zn}$  under ultra sonication is called \_\_\_\_\_ reaction.
- (d) The benefit of biodiesel is termed as \_\_\_\_\_ when the given biodiesel produces no net output of carbon in the form of  $\text{CO}_2$ .
- (e) Bhopal Gas Tradeqy was due to \_\_\_\_\_ gas.
- (f) The ratio of total weight of all wastes generated to the total weight of the desired product is called \_\_\_\_\_.

- (g) Write 'Yes' or 'No' in respect of the following statement.  
"Hofmann elimination reaction in water can be microwave assisted."
- (h) Strecker synthesis for disodium iminodiacetate has been replaced by \_\_\_\_\_ process.

**GROUP – B**

2. Answer any eight of the following questions within two to three sentences each. [1½ × 8

(a) What are the goals of Green Chemistry ?

(b) Write the full forms of :

WRA, LOR and BIONICS

(c) Mention the advantages of solvent free reactions.

(d) What is antifoulant ? Give one example.

(e) What are right fit pigments ?

(f) What do you understand about biomimetic reagents ?

(g) What are immobilized solvents ?

(h) Explain the concept of cradle to cradle carpetting.

(i) Explain "Combinatorial Green Chemistry".

(j) Explain what is sustainable development.

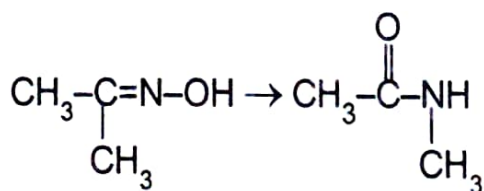
[ 3 ]

**GROUP – C**

3. Answer any eight of the following questions within 75 words each.

[2 × 8

- (a) What are the requirements of a green solvent ?
- (b) Explain the four principles of Inherent Safer Design (ISD).
- (c) How can Ibuprofen be obtained by green synthesis ?
- (d) Suggest the green synthesis of catechol.
- (e) Give an example of Diels-Alder reaction in organic solvent which is microwave assisted reaction.
- (f) Explain ultrasound assisted saponification.
- (g) Calculate percentage atom economy of following reaction :



- (h) What are the limitations of Green Chemistry ?
- (i) Explain how green synthesis method can mitigate the fossil fuel problem in real world.
- (j) Explain giving examples the renewable and non-renewable sources of energy.

P.T.O.

GROUP – D

Answer **all** questions.

4. Write down the twelve principle of Green Chemistry. [6]

OR

Write notes on :

[3 × 2]

- (i) Phase transfer catalysts
- (ii) Draw phase diagram of super critical state of CO<sub>2</sub>
5. Using *E. coli* bacteria (biocatalyst), how can adipic acid be synthesised from D(+) Glucose and also highlight the safer route to cyclohexanol. [4 + 2]

OR

Write notes on the following :

[3 × 2]

- (i) Flixiborough accident
- (ii) Green synthesis of methyl isocyanate
6. Write notes on : [3 × 2]
- (i) Green synthesis of methyl methacrylate
- (ii) Microwave assisted decarboxylation in organic solvent

[ 5 ]

OR

Explain the following :

[3 × 2

(i) Green synthesis of furfural

(ii) Ultrasound assisted esterification

7. Explain synthesis of poly lactic acid (plastic) from corn. [6

OR

Give a brief account about surfactants for CO<sub>2</sub> for dry cleaning and precision cleaning. [6