

6 SEM TDC CHM M 5

2014

(May)

CHEMISTRY

(Major)

Course : 605

(Organic Chemistry)

Full Marks : 48

Pass Marks : 19

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

1. Give the correct answer from the following :

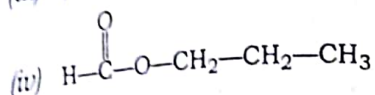
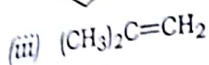
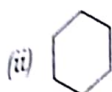
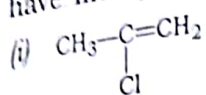
1×5=5

(a) Retrosynthetic arrow is used

- (i) to carry out the function of a synthon
- (ii) to indicate the reverse of a synthetic reaction
- (iii) to the reverse of a real reaction
- (iv) None of the above

(3)

(b) Which of the following compounds will have multiplet in their NMR spectra?



(c) The dye which is also used in medicine is

- (i) crystal violet
- (ii) congo red
- (iii) methyl orange
- (iv) alizarin

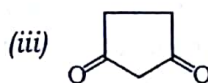
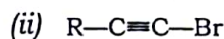
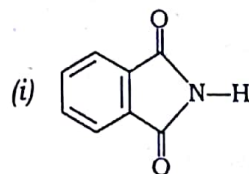
(d) The word 'tacticity' is related to

- (i) physical property of a polymer
- (ii) thermal behaviour of a polymer
- (iii) stereochemistry of a polymer
- (iv) use of a polymer

(e) One alternative Green method for organic synthesis is the use of

- (i) organic liquid
- (ii) ionic liquid
- (iii) non-volatile solvent
- (iv) organic solvent

2. (a) Write down the synthons for the following synthetic equivalents (any two) : 1×2=2



(b) Give one example of each of the following types of dye based on application to fibre : ½×4=2

- (i) Acid dye
- (ii) Basic dye
- (iii) Direct dye
- (iv) Vat dye

(c) How will you differentiate the following with the help of IR spectrum?

1+1=2

- (i) Aliphatic and aromatic C—H stretching
- (ii) Aldehyde and carboxylic acid

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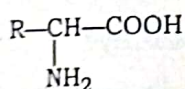
- (d) Define isotactic and syndiotactic polymers with suitable example. 1+1
- (e) What is E-factor? How is it related to the efficiency of a reaction? 1+1

UNIT—I

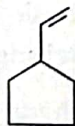
3. What do you mean by FGI? Give the importance of FGI in retrosynthetic analysis. 1+2

Or

Illustrate the synthesis of the following 1,2-difunctionalised compound. Use retrosynthetic analysis to determine the starting materials :



4. (a) "A synthetic equivalent may or may not be an intermediate of the synthesis of TM." Justify with examples.
- (b) Using disconnection approach, outline the synthesis of the following molecule :



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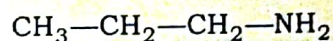
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(5)

UNIT—II

5. Answer the following questions : 1½×2=3

- (a) Water cannot be used as solvent in IR spectroscopy. Why?
- (b) Schematically show the NMR signals in both low and high resolutions for the following compound :



Or

An organic compound having the molecular formula $\text{C}_4\text{H}_8\text{O}$ gives a characteristic band at 275 nm (ϵ_{max} 17) in its UV spectrum. Its IR spectrum exhibits two important peaks at 2940 cm^{-1} – 2855 cm^{-1} and 1715 cm^{-1} . NMR spectrum shows δ 2.5 (q, 2H), δ 2.12 (s, 3H) and δ 1.07 (t, 3H). Assign a structural formula to the compound. 3

6. (a) How many modes of fundamental vibration are possible for the following molecule?



Also name the modes of vibration. 2

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(b) What is chemical shift? What are the units for expressing chemical shifts? $1+1=2$

Or

How would you differentiate between $\text{CH}_3\text{—CO—CH}_3$ and $\text{CH}_3\text{—CO—CH=CH}_2$, using IR and UV spectra? $1+1=2$

UNIT—III

7. What are triglycerides and phosphoglycerides? Give example of each with structure. $2+2=4$

Or

What is saponification value? What is the significance in determining the quality of lipid? What is iodine number? $1+2+1=4$

UNIT—IV

8. What do you mean by the following terms (any two)? 2

- (a) Chromogen
- (b) Auxochrome
- (c) Bathochrome
- (d) Hypsochrome

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(Continued)

(7)

9. Discuss the preparation of phenolphthalein. Account for the colour changes occurring when phenolphthalein is used as indicator in acid-base reaction. $1\frac{1}{2}+1\frac{1}{2}=3$

Or

Give the synthesis of the following dyes : $1\times 3=3$

- (a) Methyl orange
- (b) Alizarin
- (c) Crystal violet

UNIT—V

10. Discuss the mechanism of a peroxide initiated chain growth polymerization process involving any vinyl polymer. 3

Or

What is Ziegler-Natta polymerization? How many types of combinations are possible taking head and tail of monomers? $1+2=3$

11. Sketch the structures of two synthetic rubber. Mention their characteristics. 2

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12. A polymer sample has the following distribution of molecular weight :

Molecular weight :	3000	4000	10000
Percentage :	10	40	50

What are the number- and weight-average molecular weight of the sample of polymers?

Or

What is a natural rubber? To increase the utility of natural rubber which modification can be made?

1+1=2

UNIT—VI

13. What are biodegradable plastics? Give example. Why is it used as a green alternative to conventional plastic?

1+2=3

Or

Why are use of most of the organic solvents not preferred in Green chemistry? Mention four alternative ways for replacement of solvents.

1+2=3
