(23)

6 SEM TDC CHM M 5

2016

(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. Choose the correct answer from the following : 1×5=5

(a) Which one is the correct synthetic equivalent of the synthon $\overset{\ominus}{N}H_2$?

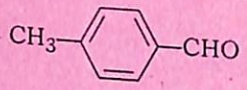
(i) NH_3

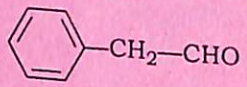
(ii) KNH_2 / NH_3 (l)

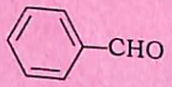
(iii) $H_2N—OCH_3$

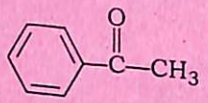
(iv) $H_2N—Cl$

(b) The NMR spectrum of an unknown compound which exhibits signals δ 7·5–8·0 (m, 5H) and 10·0 (s, 1H). Which of the following structures is in conformity with the data?

(i) 

(ii) 

(iii) 

(iv) 

(c) Eye lenses are manufactured by

(i) PMMA

(ii) Teflon

(iii) PVC

(iv) Buna-N

(d) Which of the following is an auxochrome?

(i) —N=O

(ii) —NO_2

(iii) —N=N—

(iv) —OH

(Continue

(e) Which of the following is a challenge for green chemistry?

(i) Awareness of the benefits of green chemistry

(ii) Developing chemicals that are not recyclable

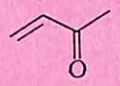
(iii) Knowing when to reduce and eliminate hazardous waste

(iv) Training for cleaning up chemical spills

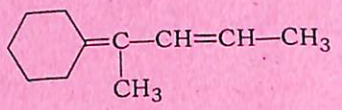
2. Answer any *five* questions : 2×5=10

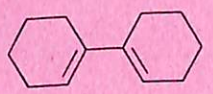
(a) Simply show where to disconnect and mention the synthons and synthetic equivalents of the following : 1+1=2

(i) 

(ii) 

(b) Calculate λ_{max} in UV spectrum for the following : 1+1=2

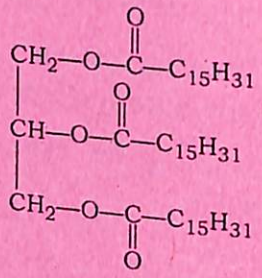
(i) 

(ii) 

(Turn Over)

(c) What is chemical shift? What are the units for expressing chemical shift?

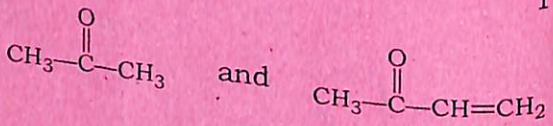
(d) Calculate the saponification value of the following ester (lipid) :



(e) What are leucocompounds? How is malachite green prepared?

(f) What is copolymerization? Write the structure of the copolymer of styrene and methyl-methacrylate.

(g) How will you distinguish between the following pair of compounds using IR and UV spectra? 1+1



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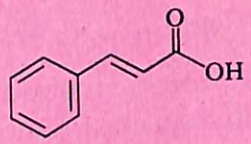
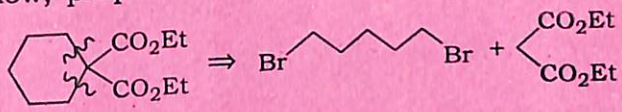
UNIT—I

3. Synthesize the following compound with proper retrosynthetic analysis : 2



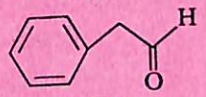
Or

From the disconnection pattern shown below, propose the synthesis for the TM : 2



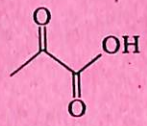
TM

4. What is Wittig reaction? How would you synthesize the following target molecule working reverse Wittig reaction? 3



TM

5. What do you mean by FGI? Mention where to disconnect the following ketocarboxylic acid and suggest its synthesis : 3



(Turn Over)

UNIT—II

Answer *any* **one** question

6. *(a)* Explain the effect of polar solvent on $\pi \rightarrow \pi^*$ and $n \rightarrow \pi^*$ transitions.

(b) Identify the compound by analysis the following spectral data :

IR ν (cm^{-1}) : 1600, 1715, 3000

Mass (m/e) : 43, 91, 134 (M^+)

NMR δ value : 2·1 (s, 3*H*), 3·6 (s, 2*H*), 7·3 (*m*, 5*H*)

(c) Write a note on Fermi resonance.

7. *(a)* Explain, why NMR spectrum of benzene is observed at a lower field whereas that of acetylene is observed at a higher field strength.

(b) An organic compound having molecular formula C_4H_8O gives a characteristic band at 275 nm (ε_{max} 17) in its UV spectrum. Its IR spectrum exhibits two important peaks at 2940–2855 cm^{-1} and 1715 cm^{-1}.

NMR spectrum of the compound is as follows :

δ 2·5 (*q*, 2*H*), δ 2·2 (s, 3*H*) and δ 1·07 (*t*, 3*H*)

Assign the structure of the compound.

(Continued

26

UNIT—III

8. *(a)* What are phospholipids? Give an example of phospholipid with structure. 1+1=2

Or

What are the functions of triglycerides? 2

(b) How do you isolate carboxylic acid and alcohol from fat and oil? 2

Or

What is hydrogenation of oil? What is its importance in lipid chemistry? 2

UNIT—IV

Answer *any* **one** question

9. *(a)* Discuss briefly the quinoid theory of colour and constitution. 3

(b) How would you synthesize the following (any *one*)? 2

(i) Indigo from anthranilic acid

(ii) An anthraquinone dye from anthracene

(Turn Over)

10. (a) Account for the colour changes occurring, when the following is used as indicator in acid-base titration :

Methyl orange or Phenolphthalein

(b) Write the structure of malachite green indicating the presence of chromophores and auxochrome in it.

(c) What is Congo red? How is it prepared?

UNIT—V

Answer *any* **one** question

11. (a) What is the role of AIBN (azobis-isobutyro nitrile) in free radical vinyl polymerization?

(b) Illustrate the process of condensation polymerization, with particular emphasis in the formation of polyesters.

(c) Write a note on phenol-formaldehyde resins.

12. (a) What does 6,6 indicate in Nylon-6,6? In what way it is different from Nylon-6?

(b) What are the differences between thermoplastic and thermosetting plastics?

(Continued

(c) What is natural rubber? To increase the utility of the natural rubber, which modification has to be made? 2

UNIT—VI

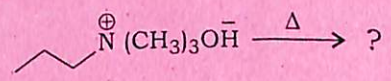
Answer *any* **one** question

3. (a) What are the twelve principles of green chemistry? 2

(b) Give two examples of the following ultrasound-assisted reactions or microwave-assisted reactions in H_2O. 1

4. (a) What do you understand by solventless process in green organic synthesis? 1½

(b) Calculate the atom economy in the following Hofmann elimination reaction : 1½



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