TDC (CBCS) Even Semester Exam., 2022

CHEMISTRY

(Honours)

(6th Semester)

Course No. : CHMHCC-602T

(Organic Chemistry)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

SECTION—A

Answer any *ten* questions : 2×10=20

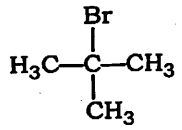
1. Define chromophore and auxochrome with example. 1+1=2

2. α,β-unsaturated esters absorb at lower wave number as compared to its saturated counterpart. Explain.

3. How will you distinguish between the following pair by IR spectroscopy?

Phenyl acetate and Methyl benzoate

4. How many ^{1}H-NMR signals are expected for the following compounds? 1+1=2



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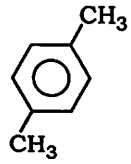


5. What do you understand by the term 'spin-spin coupling'?

6. What are equivalent and non-equivalent protons?

7. What is invert sugar?

8. What happens when glucose react with conc. HNO_3?

9. Define epimers and anomers.

10. Draw the structure of phenolphthalein and state its application.

11. What is vat dye? Give one example.

12. Give the name and structure of one triphenylmethane dye.

13. What do you mean by atactic and syndiotactic polymers?

14. What is biodegradable polymers? Give example.

15. How is Nylon-6 synthesized from ε-caprolactum?

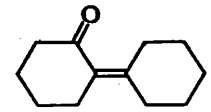
SECTION—B

Answer any *five* questions : 6×5=30

16. *(a)* Explain the various types of electronic transitions possible in formaldehyde and sketch the spectrum indicating the transitions. 3

(b) Polar solvents usually shift the $\pi - \pi^*$ transitions to longer wavelength and $n - \pi^*$ transitions to shorter wavelength. Explain. 2

(c) Calculate λ_{max} for the compound



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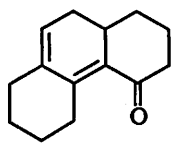
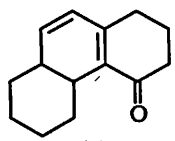
17. *(a)* How can you distinguish between inter- and intra-molecular H-bonding in any compound by IR spectroscopy? 2

(b) Discuss the effect of ring size on carbonyl absorption ($\nu_{C=O}$) in case of cycloketones. 2

(c) An unknown structure is believed to have either structure *A* or *B*. Its UV-spectrum shows λ_{max} at 320 nm (ethanol). What could be its likely structure? 2



(*A*)



(*B*)

18. *(a)* Explain why the aromatic protons are more deshielded than ethylenic protons although both the types of protons are attached to sp^2-hybridized carbons. 2

(b) How will you distinguish between *cis*- and *trans*-isomers with the help of NMR spectroscopy? 2

(c) The observed chemical shift of a proton is 324 Hz from TMS and the operating frequency of the machine is 60 MHz. Calculate the chemical shift in ppm. 2

19. *(a)* Describe the probable value of the chemical shift, relative intensities and splitting pattern taking TMS as the standard reference. Also sketch the PMR spectra of the compound

$$CH_3—CH_2—CHO$$ 4

(b) Explain with an example the effect of H-bonding on the magnitude of chemical shift. 2

20. *(a)* Why does glucose show mutarotation? 2

(b) How will you distinguish between glucose and sucrose (cane sugar)? 2

(c) Describe the conversion of aldopentose to aldohexose. 2

21. *(a)* Fructose gives positive Tollens' test. Explain. 2

(b) How will you convert D(+)-glucose to D(–)-fructose and vice-versa? 2+2=4

22. *(a)* How are dyes classified on the basis of chemical constitution? 2

(b) Give a method of preparation and application of methyl orange. 4

23. *(a)* Discuss the modern theories of colour and chemical constitution. 3

(b) Give a method of preparation of crystal violet. 3

24. *(a)* Discuss condensation polymerization with a suitable example. 4

(b) Write a short note on 'phenol-formaldehyde resin'. 2

25. *(a)* What do you mean by number average molecular weight and weight average molecular weight? 1½+1½=3

(b) Write the steps involved in the mechanism of cationic addition polymerization. 3

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