



UNIVERSITY OF NORTH BENGAL
B.Sc. Honours 6th Semester Examination, 2021

CC14-CHEMISTRY
ORGANIC CHEMISTRY

Full Marks: 40

ASSIGNMENT

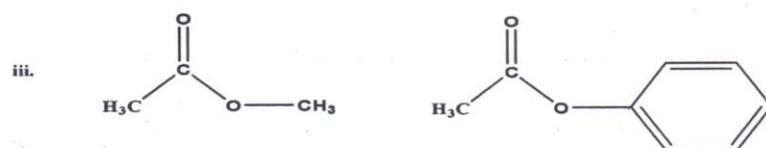
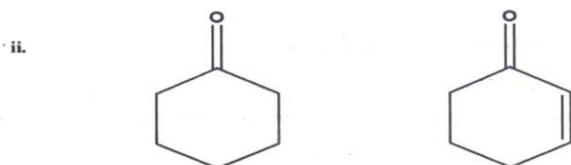
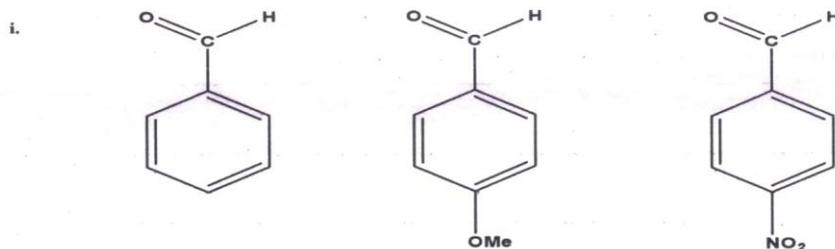
*The figures in the margin indicate full marks.
All symbols are of usual significance.*

Answer any four questions from the following

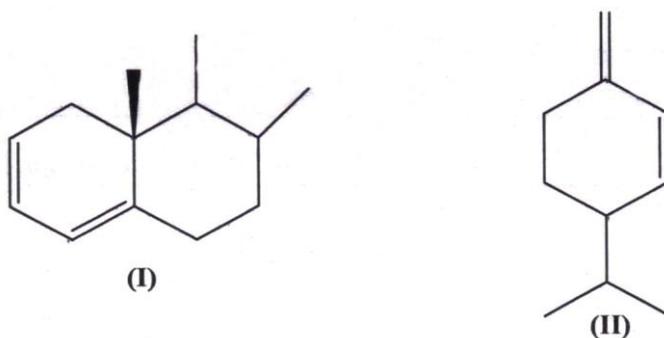
10×4 = 40

1. (a) What do you mean by the term Spectroscopy? Discuss the importance of different types of spectroscopic techniques used in Organic Chemistry. 5
- (b) Distinguish between the terms “Anomers” and “Epimers” by taking suitable aldohexoses as examples. 3
- (c) Give some examples of edible dyes along with their structure. 2

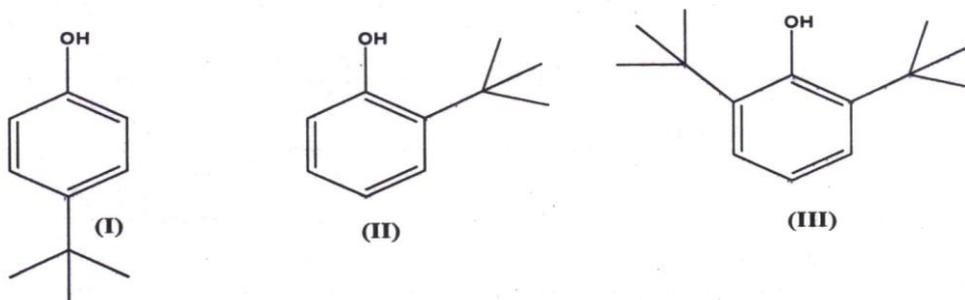
2. (a) Which of the following atomic nuclei is not NMR active? Explain. 2
 ^{12}C , ^2H , ^{19}F
- (b) How can Glucose be converted to Sorbitol? 2
- (c) Arrange the following compounds in order of their increasing C=O stretching frequencies. 2×3 = 6



3. (a) An organic compound with molecular formula $C_9H_{10}O_2$ showed the following spectral characteristics: UV : 270nm; IR : 1680 cm^{-1} ; $^1\text{H NMR}$: δ 7.6 (2H,d, $J=8\text{Hz}$), 6.9 (2H,d, $J=8\text{Hz}$), 3.9 (3H,s), 2.0 (3H,s). Deduce the structure of the compound. 4
- (b) Draw the structure of Tetramethylsilane. Why is it used as a “Reference Standard” in $^1\text{H NMR}$ technique? 1+2
- (c) Glucose and fructose give the same Osazone. Explain. 3
4. (a) What is meant by “Fingerprint region” in an IR spectrum? What is its significance? 2
- (b) What are reducing and non reducing sugars? Give examples. 2
- (c) Sucrose cannot reduce Tollen’s Reagent but maltose can. Justify. 3
- (d) Which group acts as an auxochrome in Methyl Orange dye? How is Methyl Orange dye prepared commercially? 1+2
5. (a) Calculate λ_{max} values for the following compounds according to the Empirical Rules. $2 \times 2 = 4$



- (b) What do you mean by “Larmor frequency”? What is its importance in an NMR experiment? 3
- (c) What are the products formed if you carry out two consecutive Killiani-Fischer syntheses on D-glyceraldehyde? 3
6. (a) Draw the structure a Phenolphthalein. Why does it produce a deep red colour when dissolved in alkali? 2+2
- (b) Explain the fact that in substituted phenols the O-H stretching is at 3608 cm^{-1} in (I) and at 3605 cm^{-1} and 3643 cm^{-1} in (II) whereas the stretching frequency is at 3643 cm^{-1} in (III). 3



- (c) “Glucose exhibits the phenomenon of Mutarotation”. Justify. 3

7. (a) Discuss the application of periodic acid reaction in the determination of ring size of aldohexoses. 3
- (b) An organic compound having molecular formula $C_6H_{11}BrO_2$ exhibits 1H NMR signals at: δ 4.1 (2H,q,J=7.5Hz), 4.0 (2H,t, J=7.5Hz), 1.5-2.2(4H,m), 1.25 (3H,t,J=7.5Hz). Predict the structure of the compound. 3
- (c) What are the necessary conditions that a substance must satisfy in order for it to be called as a dye? Can azobenzene (Orange red colour) be called a dye? 3
- (d) What do you mean by "Bathochromic Shift"? 1
8. (a) Define the terms "Chromophore" and "Auxochrome". 2
- (b) Give examples of two molecules that bear protons more shielded than those in TMS. 2
- (c) Write a short note on "Ruff's Degradation". 3
- (d) How can you distinguish between the following pairs of compounds by IR Spectroscopy? 3
- (i) Salicylic acid and p-hydroxybenzoic acid
- (ii) Vinyl acetate and methylacrylate.

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