

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: I.M.Sc.
BRANCH: CHEMISTRY

SEMESTER : V
SESSION : MO/2023

SUBJECT: CH327 ORGANIC CHEMISTRY-IV

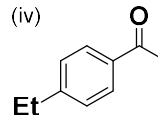
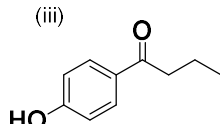
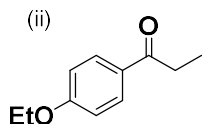
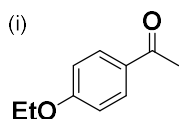
TIME: 3 Hours

FULL MARKS: 50

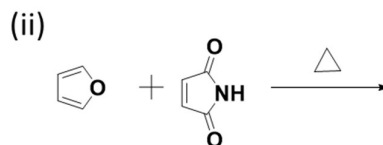
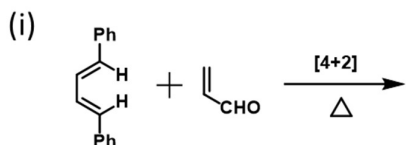
INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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- Q.1(a) (i) Explain why the aldehyde proton is highly de-shielded. [2+3]
(ii) Toluene is oxidized to benzaldehyde; what changes in ^1H - NMR spectral features would be expected for the product with respect to that for the starting materials.
- Q.1(b) How many signals will you expect in the ^1H - NMR spectrum of *o*-dinitrobenzene? Assign the signals and arrange them in the increasing order of their chemical shifts. State the splitting pattern of the signals. How can you distinguish it from *p*-dinitrobenzene from their ^1H -NMR spectra. [1+2+2]
- Q.2(a) (i) A compound $\text{C}_4\text{H}_6\text{O}_2$ shows a very strong IR band at 1720 cm^{-1} and only one singlet signal in its ^1H NMR spectrum. Analyze the compound. [2.5+2.5]
(ii) A compound $\text{C}_6\text{H}_{12}\text{O}$ shows a strong IR band at 1705 cm^{-1} and two singlet signals at 2.1 and 1.2 ppm in ^1H NMR spectrum. Analyze the compound.
- Q.2(b) (i) A Compound having molecular formula C_7H_{16} (A). In ^{13}C NMR, compound (A) gave 3 peaks and in ^1H NMR it also gave 3 peaks, a doublet, a triplet and a multiplet. Provide a structure for compound A. [2.5+2.5]
(ii) An organic compound exhibited the following ^1H NMR spectra data: δ 7.80 (2H, d, $J = 8\text{ Hz}$), 6.80 (2H, d, $J = 8\text{ Hz}$), 4.10 (2H, q, $J = 7.2\text{ Hz}$), 2.4 (3H, s), 1.25 (3H, t, $J = 7.2\text{ Hz}$). Find out the correct one and explain in detail.

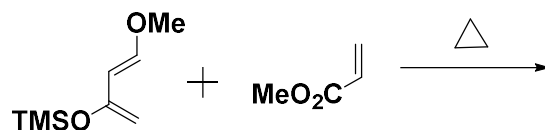


- Q.3(a) i) Draw and demonstrate the Hemiacetal formation for D-Glucose from Fisher projection to Haworth projection form. ii) Draw a chair form for α and β anomer and demonstrate the anomerization process. [5]
- Q.3(b) Draw and discuss the decreasing of one carbon length in D-Glucose using Ruff's Degradation. [5]
- Q.4(a) Write down the products of the following [4+2] cycloaddition reaction. explain via FMO approach, which product will be preferred and why. [2+2]



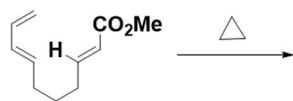
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- Q.4(b) 1) Write down the products of the following Diels-Alder reaction. Explain which one will not be formed. [2+2X2]



- 2) Write down the products of the following Diels-Alder reaction. Explain which type of reaction it is. (2 x 2)

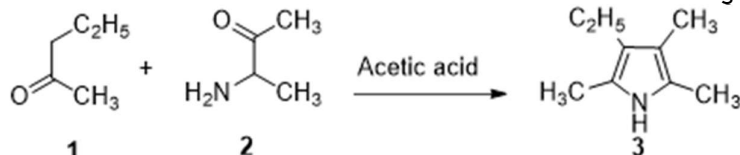
(i)



(ii)



- Q.5(a) Discuss the mechanism for the formation of 3 from the following Knorr pyrrole synthesis. [5]



- Q.5(b) Explain why pyrrole is acidic in nature? [5]

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