B. Sc. 4th Semester (Honours) Examination, 2021

CHEMISTRY

[Organic Chemistry IV (T-10)]

Paper : UG/CHEM/403/C-10

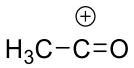
Course ID : 41413

Time: 1 Hour 15 Minutes **Full Marks: 25**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as possible

1. Answer *any five* questions: 1×5 = 5

(a) Give the synthetic equivalent(s) corresponding to the following synthon:



(b) Carryout the following transformation using Arndt-Eistert synthesis:

$CH_3COOH \rightarrow CH_3CH_2COOH$

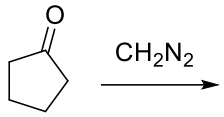
(c) Define the term 'bathochromic shift' in UV spectrum.

(d) Identify the NMR active nuclei from the given set of nuclei:

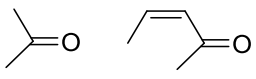
$_1H^2$, $_6C^{12}$, $_6C^{13}$, $_8O^{16}$

(e) What do you mean by stereoselective reaction?

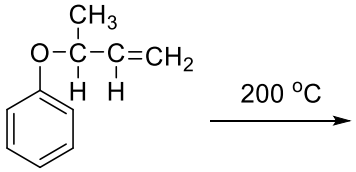
(f) Predict the product(s):



(g) Match the IR absorption at 1685 cm^{-1} and 1715 cm^{-1} with compounds given below:



(h) Predict the product(s) for the following reaction:



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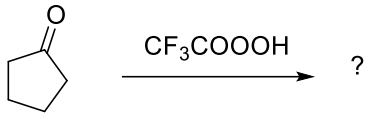
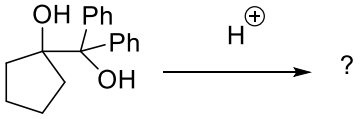
2. Answer *any two* questions: 5×2 = 10

(a) Predict the product(s) with mechanism: 2.5×2 = 5

(i)

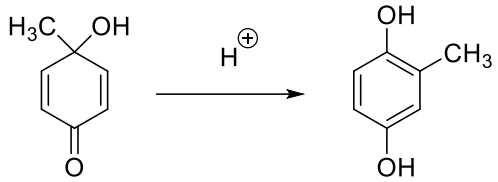


(ii)

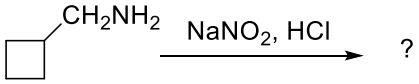


(b) 2+(1+2) = 5

(i) Give the mechanism for the following transformation:

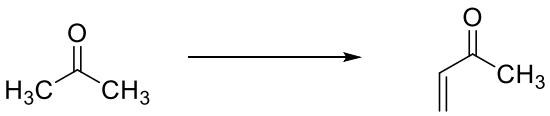


(ii) Predict all the products of the following reaction with plausible mechanism.



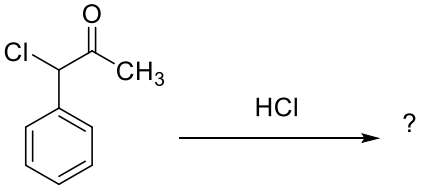
(c) 2+2+1 = 5

(i) Carryout the following transformation by Mannich reaction:



(ii) Diazo coupling reaction is pH dependant - explain.

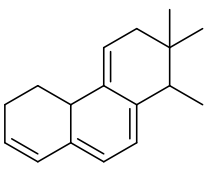
(iii) Predict the product(s) for the following reaction:



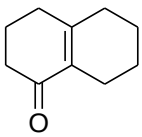
(d) 3+2 = 5

(i) Calculate λ_{max} values for the following molecules according to Woodward's rule:

(I)



(II)



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(ii) How can you distinguish between phenyl acetate and methyl benzoate by IR spectroscopy?

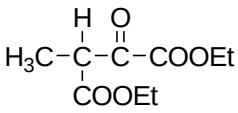
3. Answer *any one* question: 10×1 = 10

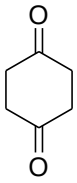
(a) 3+3+4 = 10

(i) Benzenediazonium chloride does not couple with anisole whereas 2,4-dinitrophenyldiazoniun chloride does - explain.

(ii) What is benzil benzilic acid rearrangement? Give mechanism with suitable example.

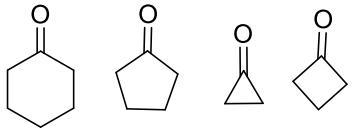
(iii) Show the retrosynthetic analysis of the following compounds and carryout the forward synthesis:

(I) 

(II) 

(b) 3+2+2+3 = 10

(i) Analyse the following cyclic ketones in decreasing order of 'C=O' stretching frequencies.



(ii) Explain why ^{1}H-NMR spectrum of CH_3OH in CCl_4 shows two singlets but in $(CD_3)_2SO$ it shows a doublet and a quartet.

(iii) Predict the products formed by the action of HNO_2 on the following compound.

(A) $PhCH_2NHCOCH_3$ (B) $PhCH_2NHMe$

(iv) Predict the major organic products in the following reaction. Explain using Felkin-Anh model.