B.Sc. (Honours) Examination, 2017

Semester-VI

Chemistry (Honours)

Course: BCHC-62

(Organic Chemistry)

Time: Three Hours **Full Marks: 30**

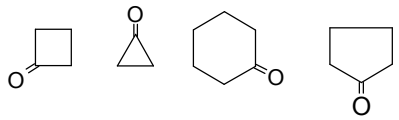
Questions are of value as indicated in the margin.

Answer ***three*** questions taking ***any one question*** from ***each of the unit***.

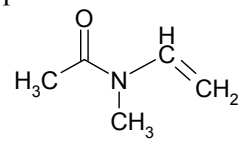
Unit-I

1. a) 2,4,6-Cycloheptatrienone shows exceptionally low carbonyl stretching frequency in its IR spectrum. Explain why. 2

   b) Arrange following compounds according to the decreasing order of their $\bar{\nu}_{C=O}$ values. Justify your answer. 2



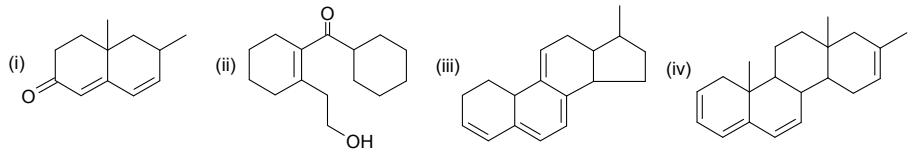
   c) Identify the carbon-nitrogen bond in compound (**A**) which will absorb light of the IR region at largest wavenumber. Give explanation. 2



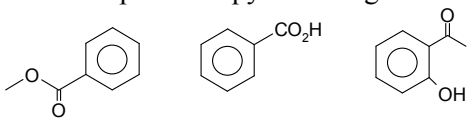
(A)

   d) Pyridine shows a λ_{max} value at 270 nm in its UV-Vis spectrum which disappears in presence of HCl. Explain why. Based on this information, can you predict the type of transition association with the absorbance of pyridine at λ_{max} 270 nm. Justify your answer. 4

2. a) Calculate λ_{max} values of the following compounds applying Woodward-Fieser Rules. 4x2



   b) Explain how could you use IR Spectroscopy to distinguish following three compounds: 2



(I) (II) (III)

UNIT-II

1. a) Suggest the probable structure of compound (**A**) (m.f. C_3H_7Cl) on the basis of its ^1H NMR signals as given below:

   i) a triplet at 0.9δ, (ii) another triplet at downfield than the previous one, (iii) a multiplet at ~ 2.0-2.5 δ. 3

   b) Predict the structure of a compound having m.f. C_9H_{12} and showing its ^1H NMR signals at δ 7.1, 2.2, 1.5 and 0.9. 3

P.T.O.

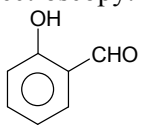
c) Define the term "Chemical Shift". 2

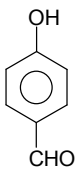
d) "Aromatic protons are more deshielded than ethylenic protons" – Explain. 2

2. a) Explain following ^1H NMR data: 6

Compound	δ (ppm)
H_3C-CH_3	0.96
$H_2C=CH_2$	5.84
$HC\equiv CH$	2.88

b) How will you distinguish two compounds in each pair given below using ^1H NMR spectroscopy: 4

(i) 

and 

(ii) *Cis*- and *trans*- stilbene

UNIT-III

1. a) Carry out following transformations: 2x2

i) D-Glucose → 2,3-*O*-dimethyl glucose

ii) D-glucose → 3-*O*-methyl glucose

b) Predict the product in each of the following cases: 2x3

i) D-galactose $\xrightarrow[H^+]{\rangle=O}$? ii) D-mannose $\xrightarrow[H^+]{\rangle=O}$?

iii) D-glucose $\xrightarrow[\substack{NaOAc\\100^oC}]{Ac_2O}$? $\xrightarrow{HBr}$? $\xrightarrow[AcOH]{Zn}$?

2. a) Give explanations for the following statements:

i) Br_2/H_2O specifically oxidizes the β-anomer of glucose. 2

ii) Methyl-α-glucopyranoside is more stable than its β-anomeric form. 2

b) Predict the product(s) in each of the following cases. Give plausible mechanism also:

i) D-glucose $\xrightarrow{3PhNHNH_2}$? 2

ii) Methyl-α-D-glucopyranoside $\xrightarrow{2HIO_4}$? 2

iii) D-glucose $\xrightarrow[0.02\,M]{Ca(OH)_2}$? 2

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