This question paper contains 8+1 printed pages]

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M.Sc. (Sem. I) Examination, Jan. 2020

CHEMISTRY

Paper-1.2

CHEM-512

(Organic Chemistry)

Time Allowed : Three Hours

Max. Marks : 70

Min. Pass Marks : 28

*This question paper will be of [illegible] pages in **three** sections as under*

Section-A *Max Marks-10*

*will carry 10 marks with [illegible] comprising **10** short answer type questions (maximum **20** words answer) taking two questions from each unit. Each question shall be of one mark.*

Section-B *Max Marks-25*

*will carry **25** marks with equally divided into **five** long answer type questions (answer about in **250** words). **Students** are instructed to attempt **five** questions by selecting **one** question from each unit*

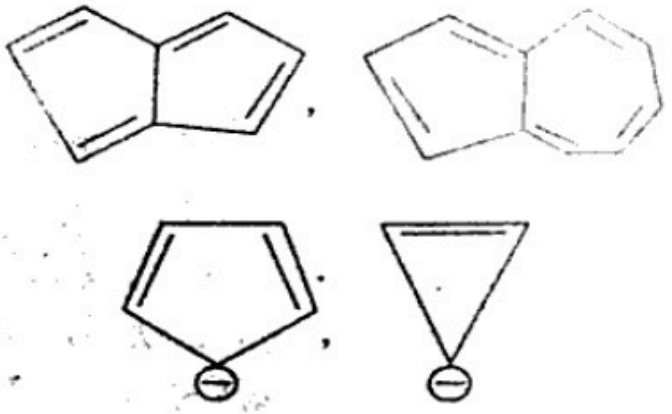
Section-C ***Max. Marks-35***

*will carry **35** marks with **five** long answer type questions comprising **one** compulsory question of 15 marks and **four** questions of 10 marks each. Students are instructed to attempt total **three** questions with one compulsory question (answer about in 500 words) and any two more questions (answer about in 400 words) out of remaining **four** questions.*

Section A

1. (i) **Give the example** of alternant and non-**altrenant hydrocarbon** with their structure

(ii) **Identify the aromatic** and non-aromatic **compound in the** following



3. Write short notes on : 2×2½=5

(i) Tautomerism

(ii) Catenanes and rotaxanes.

UNIT-II

4. Derive the Hammett equation. Explain the physical significance of substituent and reaction constant. 2+1½+1½=5

5. Write short notes on : 2½+2½=5

(i) Isotope effect

(ii) Carbene and nitrene.

UNIT-III

6. Explain stereospecific and stereoselective synthesis with suitable example. 2½+2½=5

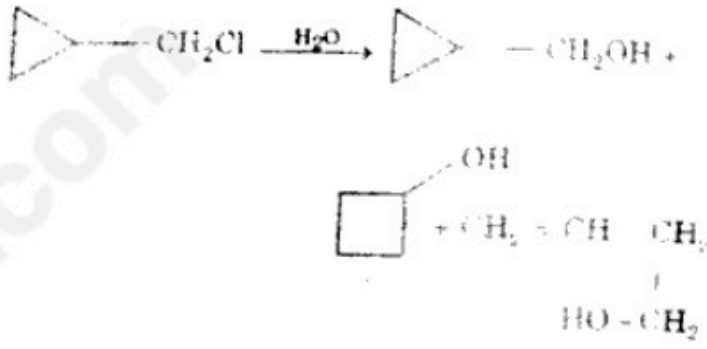
7. Write short notes on : 2½+2½=5

(i) Methods of resolution

(ii) Effect of conformation on reactivity.

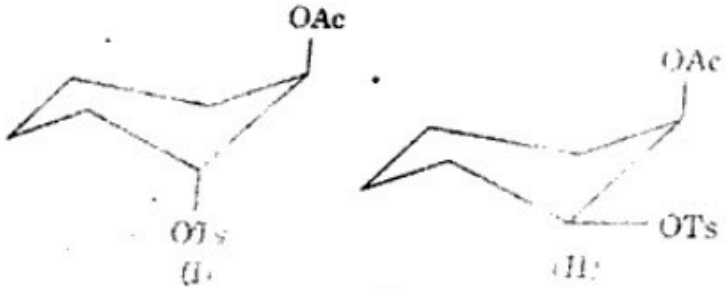
UNIT-IV

8. Sketch a suitable mechanistic scheme for each of the following transformation 2×2½=5

(i) 

(ii) 

9. Why does the trans isomer I undergo acetolysis 670 times faster than the cis isomer II. Discuss the stereochemistry of product. 5



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(iii) Write down the Taft equation

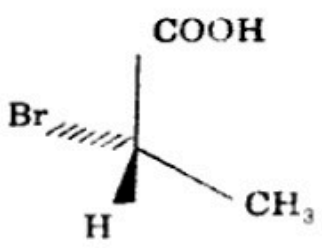
(iv) Arrange the following carbocation in order of increasing stability :

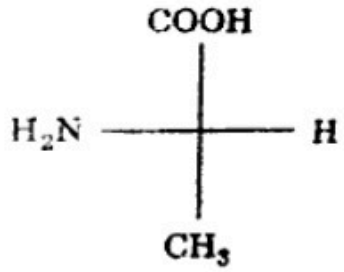
$C_6H_5\overset{\oplus}{C}H_2$, $(C_6H_5)_2\overset{\oplus}{C}H$, $(CH_3)_2\overset{\oplus}{C}H$,

$(CH_3)_3\overset{\oplus}{C}$, $\overset{\oplus}{C}H_3$, $CH_3\overset{\oplus}{C}H_2$.

(v) What are invertomers ?

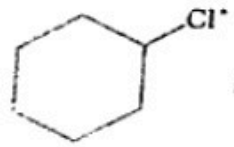
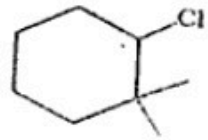
(vi) Give R/S Nomenclature of the following :





(vii) Which substrate in each of the following pair will react more rapidly with hydroxide ions under S_N2 reaction condition

(a) CH_3CH_2I and CH_3CH_2Cl

(b)  and 

(viii) Define regioselectivity.

(ix) Explain why compared to aniline ($C_6H_5NH_2$), acetanilide ($C_6H_5NHCOCH_3$) is somewhat deactivated toward electrophilic aromatic substitution.

(x) From the following set, select the most reactive and least reactive substrate towards ring nitration :

(a) Benzene, Toluene, Nitrobenzene and Bromobenzene. 1×10=10

Section B

UNIT-I

2. What do you mean by addition compounds ? Explain crown ether complexes and cryptands

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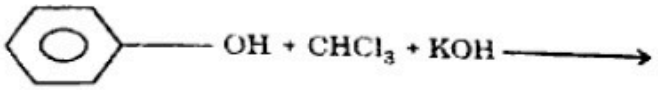
UNIT-V

10. Write short notes on : 2×2½=5

(*i*) S_E2, S_Ei and S_Ei mechanism

(*ii*) Diazonium coupling.

11. Give the structure of the product(s) and outline the mechanism involved in each of the following reactions : 2×2½=5

(*i*) 

(*ii*) 

Section C

12. What is Huckel's rule ? Explain the aromaticity in benzenoid and non-benzenoid compounds by suitable examples. 2+8=10

13. (*i*) How will you determine the mechanism of a reaction by intermediates analysis and stereochemical studies. 2×2½=5

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