

Your Roll No.-----

B.Sc.-M.Sc. INTEGRATED PROGRAM (CHEMISTRY)
SEMESTER-II EXAMINATION -2018
PAPER CODE: BCH-CC5TH
PAPER TITLE: HYDROCARBONS
ORGANIC CHEMISTRY-I

Time: Three hours

Maximum marks: 75

(Write your Roll No. On the top immediately on receipt of question papers)

Attempt all questions. All parts of a question must be attempted in continuation. Start answer of a fresh question on a new page. Cite examples and draw labeled diagrams wherever necessary.

Q1. Answer very briefly of the following:

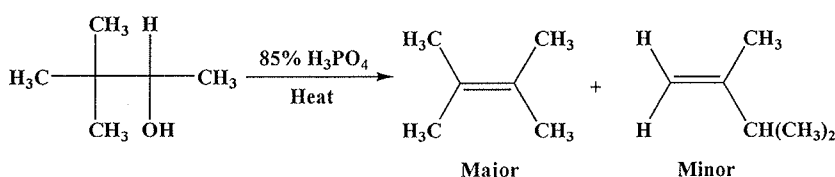
[10x1.5=15]

- What is Pitzer strain?
- Branched-chain alkanes have lower boiling points than straight-chain alkanes, justify.
- Explain the relative stabilities of alkyl radicals.
- Name a suitable reagent for radical substitution of benzylic and allylic hydrogens
- Calculate the index of hydrogen deficiency of C_4H_5N
- Which are the different beta elimination reactions?
- Good leaving group will favor E1 elimination pathway, justify.
- Which product is preferred in a Diels-Alder reaction?
- What is torsional energy?
- How many structurally different monomethyl derivatives are possible for naphthalene, anthracene and phenanthrene?

Q2. Attempt ANY THREE of the following:

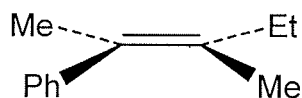
[3x5=15]

- Discuss Corey- House Synthesis of alkanes?
- Which are the three rules that govern the regiochemistry of beta elimination reactions?
- Explain the formation the major and the minor product in the following reaction



D. Give the mechanism of addition of bromine to cyclopentene.

E. On addition of HBr to the following alkene how many products will form. Explain the mechanism of their formation



Q3. Attempt ANY THREE of the following:

[3x5=15]

A. Draw energy versus dihedral angle graph for ethane

B. What is Baeyer strain theory?

C. Draw the conformational structures for the following

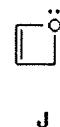
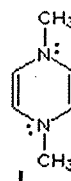
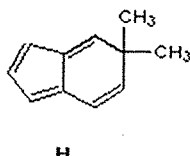
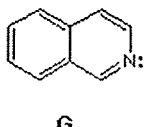
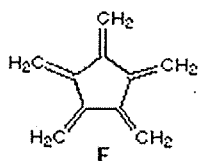
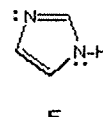
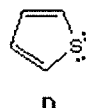
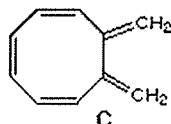
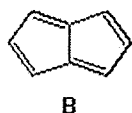
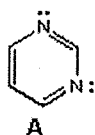
- | | |
|----------------------------------|-------------------------------------|
| i) 1,1-dimethylcyclohexane | ii) 1-t-butyl-1-methylcyclohexane |
| iii) cis-1,2-dimethylcyclohexane | iv) trans-1,2-dimethylcyclohexane |
| v) cis-1,3-dimethylcyclohexane | vi) trans-1,3-dimethylcyclohexane |
| vii) cis-1,4-dimethylcyclohexane | viii) trans-1,4-dimethylcyclohexane |

D. Discuss 1,3- diaxial interactions in mono-substituted cyclohexane

E. Planar cyclopentane would have no angle strain but very high torsional strain, justify.

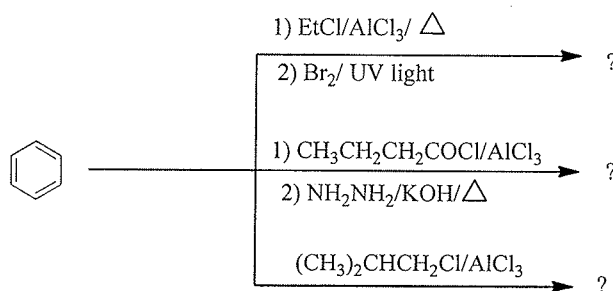
Q4. Answer ANY THREE of the following:

A. Which of the following compounds can be considered as aromatic by application of Huckel's rule



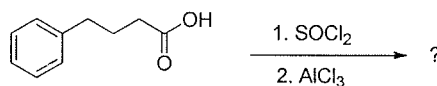
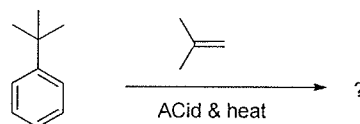
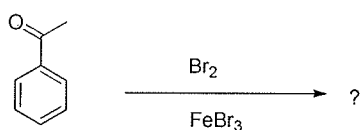
B. Why would a compound be anti-aromatic? Explain with examples.

C. What are the major products of the following three reactions?



D. What are the major products from the reactions of phenyl ethanoate and ethyl benzoate with $\text{HNO}_3 / \text{H}_2\text{SO}_4 / \text{heat}$?

E. What are the major products of the following three reactions?

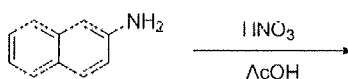
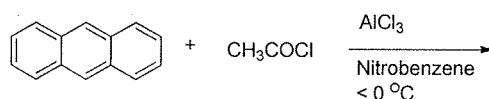


Q5. Attempt ANY THREE of the following:

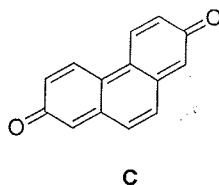
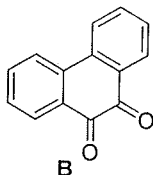
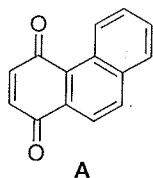
[3x5=15]

A. Based on the resonance energies of polycyclic aromatics like naphthalene and phenanthrene, suggest why they are more reactive than benzene.

B. Which is the most probable main product of the following three reactions?



- C. Phenanthrene is oxidized more easily than benzene or naphthalene. Chromic acid oxidation of phenanthrene forms a substance known as phenanthraquinone. Which structure, A, B, or C, would you expect to be formed most readily by oxidation of phenanthrene? Explain.



- D. Naphthalene can be reduced more easily than benzene, justify with examples.
- E. Why is 9,10 bond in phenanthrene quite reactive, almost as reactive as an alkene double bond?
