[This question paper contains 5 printed pages.]

1246 *Your Roll No.* .....

B.Sc. (Hons.)/I **A**

CHEMISTRY – Paper II

(Organic Chemistry)

Time : 3 Hours *Maximum Marks : 38*

(Write your Roll No. on the top immediately on receipt of this question paper.)

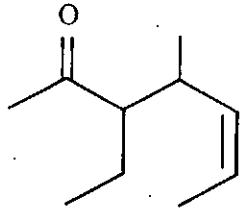
Attempt **Six** *questions in all.*

Question No. **1** *and* **7** *carry* **seven** *marks each.*

1. (a) An Organic compound $A(C_{16}H_{16})$ on ozonolysis gives only one product $B(C_8H_8O)$. Compound B on reaction with iodine in presence of sodium hydroxide gives sodium benzoate. B also reacts with hydrazine in presence of KOH to give $C(C_8H_{10})$. Deduce the structures of A, B and C. Give equations and name of the reactions involved. Also explain the mechanism of conversion of B to sodium Benzoate. (4)

(b) Give the IUPAC names of the following compounds :–

(i)



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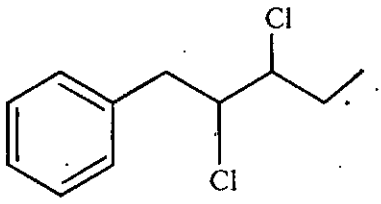
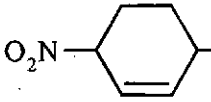
(ii) 

(iii) 

(3)

2. (a) Write down the product(s) obtained on dehydration of 3,3-dimethylbutan-2-ol. (1½)

(b) Justify the statement that aryl and vinyl halides show low reactivity towards nucleophilic substitution reaction compared to alkyl halides. (1½)

(c) In buta-1,3-diene, 1,4-addition occurs slower than 1,2-addition at low temperature. Explain. (1½)

(d) In terms of hyperconjugation, explain the order of stability of carbocations. (1½)

3. (a) Why is nitration of toluene much faster compared to nitration of nitrobenzene ? Name the product(s) formed in each case. (2)

(b) Which one is more acidic :– o- or p-nitrophenol and why ? (1½)

(c) Account for aromaticity observed in 1,3,5-cycloheptatrienyl cation but not in 1,3,5-cycloheptatriene. (1)

(d) Write a note on paper chromatography. (1½)

4. (a) o-Bromomethoxybenzene on reaction with sodamide in liquid ammonia, does not give o-methoxyaniline. What is the product obtained in this reaction ? Explain with mechanism. (1½)

(b) Explain the order of stability of various conformations of cyclohexane. (1½)

(c) Which of the following is more basic :–

Benzylamine and N-formylbenzylamine and why ? (1½)

(d) The thermal chlorination of propane at 300°C gives 48% of 1-chloro and 52% of 2-chloro isomer, while chlorination of isobutane gives 67% of 1-chloro and 33% of 2-chloro isomer. Calculate the relative order of reactivity for 1°, 2° and 3° hydrogens. (1½)

5. (a) What are the products obtained when 2-chloro-1-phenylpropane undergoes dehydrohalogenation ? Which is the major product and why ? (1½)

(b) Arrange and explain the order of nucleophilicity of halide ions in water. (1½)

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(c) Discuss the stereochemistry of addition of bromine to E-But-2-ene. (2)

(d) What are antiknocking compounds ? (1)

6. Carry out the following conversions :–

(a) Acetaldehyde to n-butyl alcohol

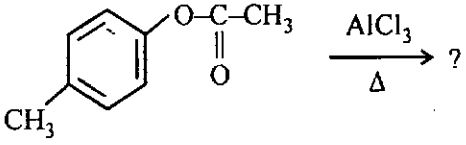
(b) Propyne to tert-butyl alcohol

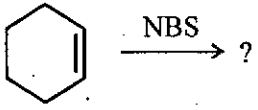
(c) Benzene to m-bromophenol

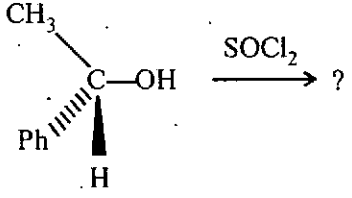
(d) Isopropyl chloride to n-propyl chloride (4×1½)

7. Complete the following reactions (with mechanism) :–

(a) $(CH_3CH_2)_3CBr \xrightarrow[CH_3OH]{25°C} ?$ (1½)

(b)  (1½)

(c)  (1½)

(d)  (1½)

(e) $CH_3–CH_2–CH_2–Li + CH_3NH_2 \longrightarrow$? (1)

8. (a) How many moles of HIO_4 are consumed by one mole of 2,4-dimethyl-2,3,4-hexanetriol ? Write down the products obtained in this reaction. (1½)

(b) Write down the mechanism of formation of phenol from cumene. (1½)

(c) Whether o- or m- chloronitrobenzene undergoes faster nucleophilic substitution and why ? (2)

(d) Between 1,3-pentadiene & 1,4-pentadiene, which is more stable and why ? (1)