

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

CLASS: MSc/IMSc
BRANCH: Chemistry

SEMESTER : I/VII
SESSION : MO/2024

SUBJECT: CH405R1 PRINCIPLES OF ORGANIC SYNTHESIS

TIME: 3 Hours

FULL MARKS: 50

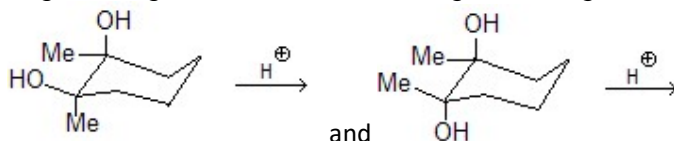
INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall. NO

- Q.1(a) Compare the saponification rate for cis and trans isomer of 4-tertiarybutyl cyclohexanol. Give the product(s) and include the mechanistic details for following reaction. [2+3] CO 1 BL I

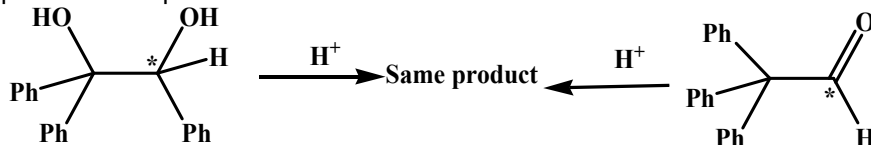


- Q.1(b) Identify the major and minor product for reaction of 4-tertiarybutyl cyclohexanone with Grignard reagents. How do the following reactions give different product? [2+3] 2 II



- Q.2(a) Write short note on kinetically controlled and thermodynamically controlled reaction with example. From the cross product experiment proof that Fries rearrangement is intermolecular. [3+2] 2 II

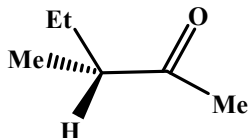
- Q.2(b) Explain the formation of bezyne intermediate formation by considering the formation of unexpected major product for a reaction. Explain the mechanism for following reaction to explain the isotopic dilution [2+3] 2 III



- Q.3(a) Explain the Hammond postulate with example. Show the proper energy diagram to explain the major product obtained for base-induced dehydrohalogenation of 2-bromobutane. [2+3] 3 I

- Q.3(b) Write the Hammett sigma-pi relationship and explain the significance of those terms. Explain the C- or O-Alkylation with the help of HSAB principle. [2+3] 3 II

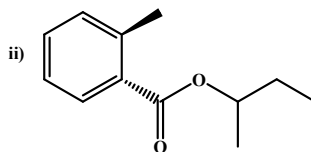
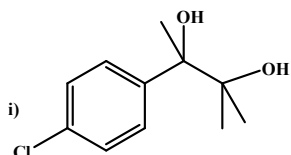
- Q.4(a) Explain racemization and resolution. How does the following compound racemize in ethanol solution in presence of NaOEt? [5] 3 IV



Q.4(b) Explain the open ring and chelate model of Cram's rule and correlate those model with suitable example. [5] 4

Q.5(a) What is the basic difference between synthon and synthetic equivalent? Give examples. [5] 4 II
Write short note on FGI (functional group interconversion)

Q.5(b) Give the retrosynthetic pathway for the following compounds and show the synthesis scheme also. [5] 5 V



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