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UNIVERSITY EXAMINATIONS 2022/2023

FIRST YEAR, FIRST SEMESTER EXAMINATION FOR DEGREE OF MASTER OF SCIENCE IN CHEMISTRY

SCH 7115: MODERN SYNTHETIC METHODS IN ORGANIC CHEMISTRY

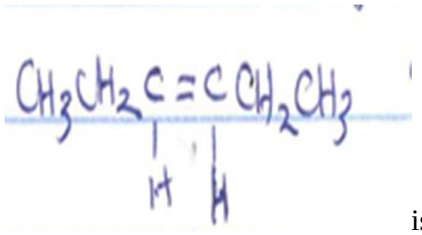
DATE: FEBRUARY 2023 **TIME: 3 HOURS**

INSTRUCTIONS: Answer Question ONE and any other TWO questions.

QUESTION ONE (30 MARKS)

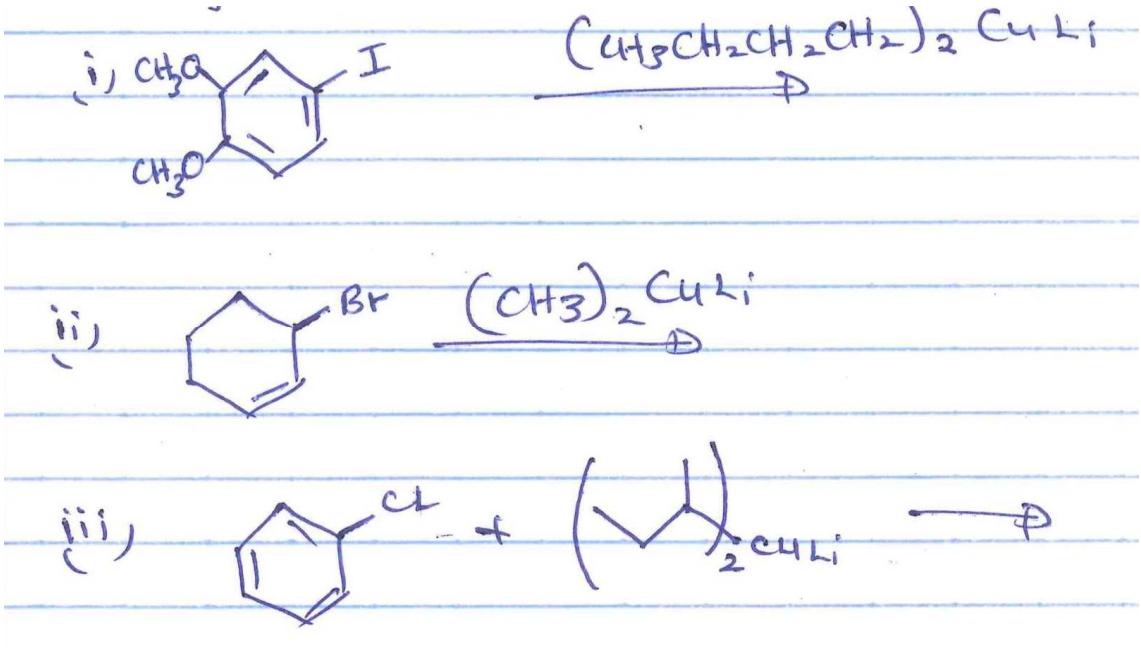
a) Briefly describe features of cerbenes the are common with carbonations and carbon radicals. (4 Marks)

b) Draw all the stereoisomers formed when 3-hexene,



is treated with $CHCl_3$ and $KOC(CH_3)_3$. (8 Marks)

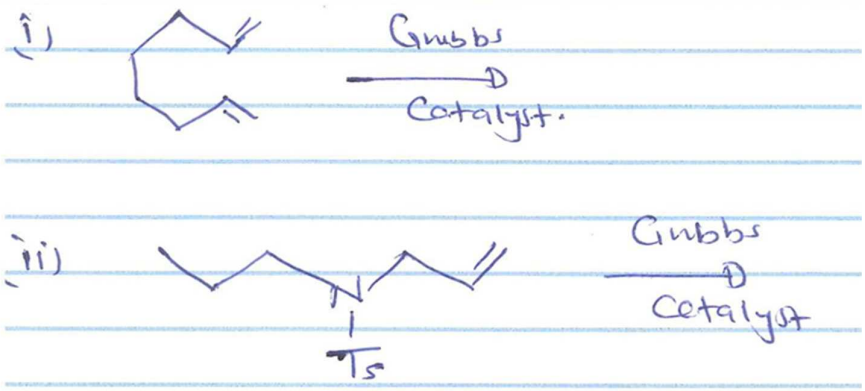
c) Draw the main products of the following coupling reactions.



(6 Marks)

d) Using relevant equations, briefly describe the mechanism involved in the heck reaction. (8 Marks)

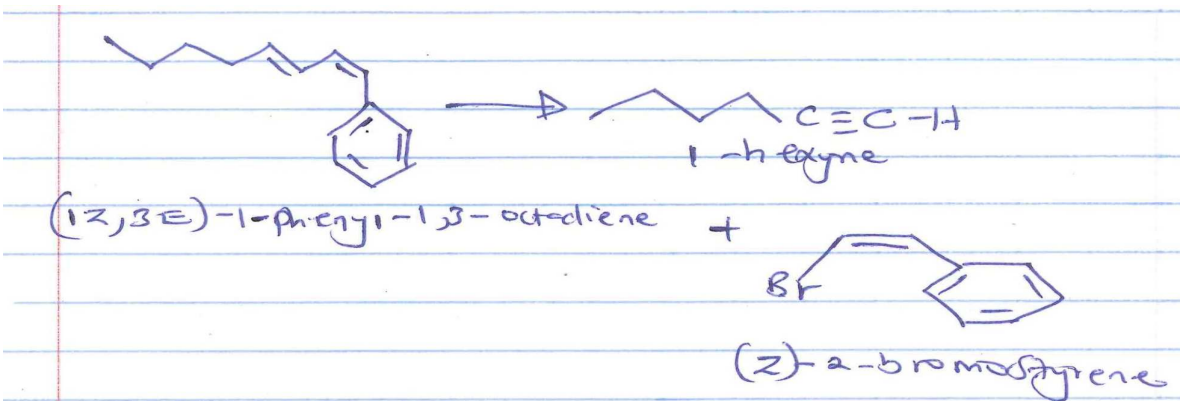
e) Draw the products formed from ring closing metathesis of the following reactions.



(4 Marks)

QUESTION TWO (20 MARKS)

a) Derive a synthesis of (12, 3E)-1-Phenyl-1,3- octadiene from 1-hexyne and (z) -2-bromo styrene using a Zuzuki coupling.



(8 Marks)

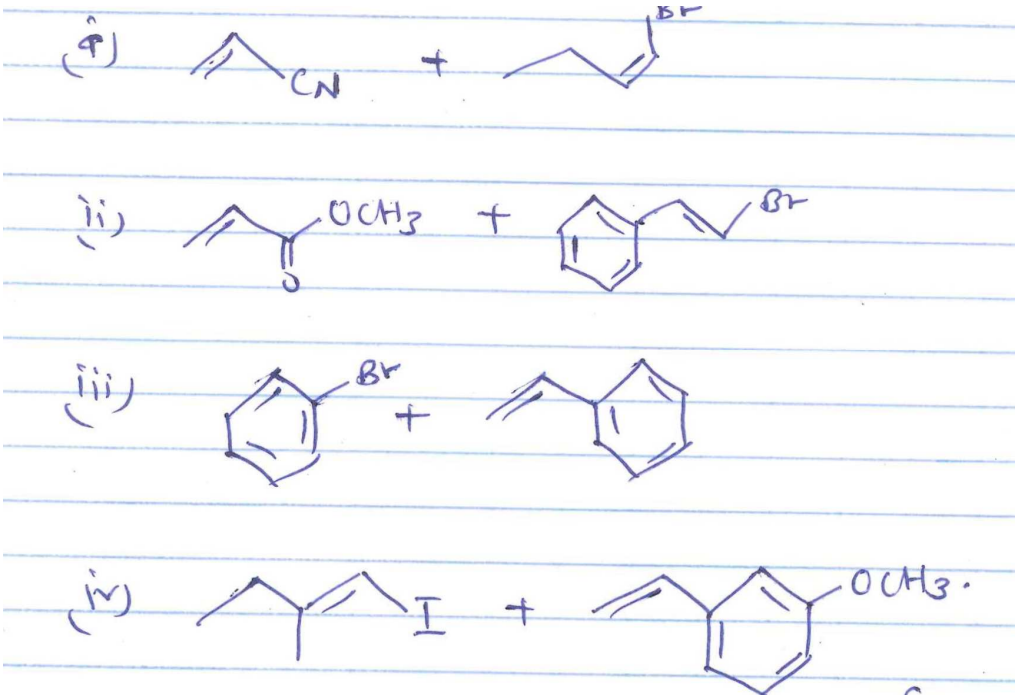
b) Show the synthesis of 1-methylcyclohexene form 1-bromocyclohexene and CH_3I.

(5 Marks)

c) Using the general formula of compounds show the carbon-carbon bond formation involving the conversion of alkenes to cyclopropane heck using carbine intermediate. (2 Marks)

QUESTION THREE (20 MARKS)

a) Draw the coupling product formed when each pair of compounds is treated with pd $(OAC)_2$, $p(o\text{-tosyl})_3$, and $(CH_3CH_2)_3N$

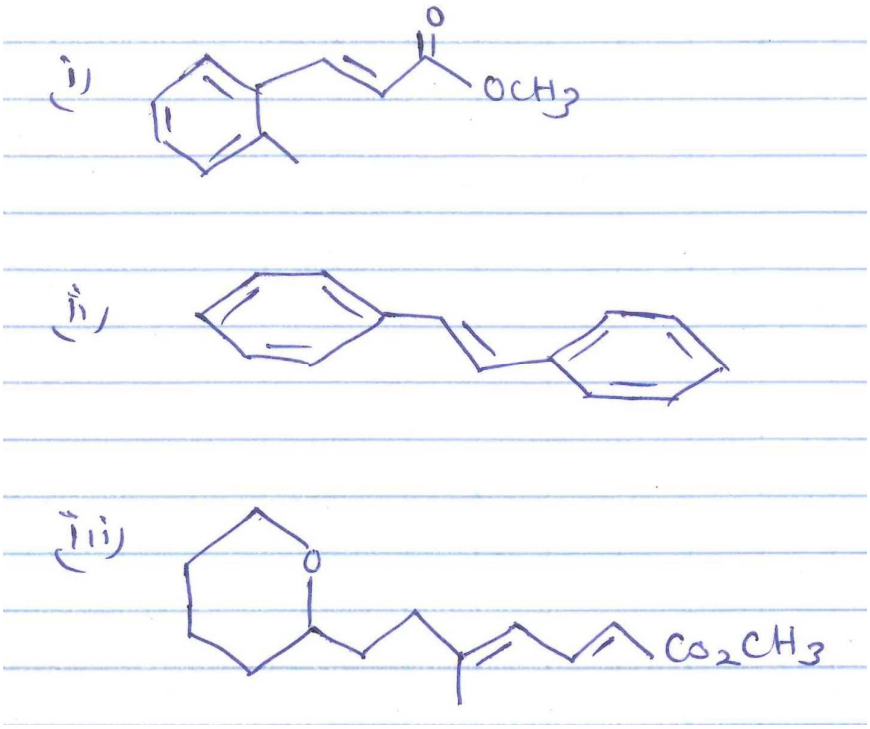


(8 Marks)

b) Using styrene, phCH=CH_2 as the starting material, draw all the products of olefin metathesis and show the pathways involved. (7 Marks)

QUESTION FOUR (20 MARKS)

a) What starting materials are needed to prepare each compound using a heck reaction.



(6 Marks)

b) Simmon-Smith reaction involves the preparation of nonhologenated cyclopanes by reaction of an alikene with diodomethane, CH_2I_2 in the presence of Zinc-Copper couple [Zn (Cu)]. Briefly describe the mechanism of this reaction using the relevant equations. (6 Marks)

c) How would you prepare organometallic reagents? (3 Marks)