

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

CLASS: MSc
BRANCH: CHEMISTRY

SEMESTER : II
SESSION : SP/2025

SUBJECT: CH410R1 MODERN ORGANIC CHEMISTRY

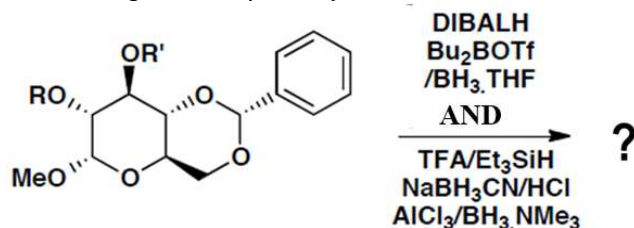
TIME: 3 Hours

FULL MARKS: 50

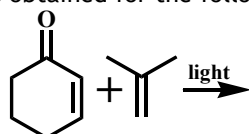
INSTRUCTIONS:

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.

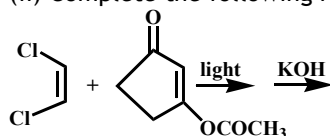
- Q.1(a) (i) Describe the easy deportation (with mechanism) of p-methoxybenzyl ether protonation to alcohol. [2+3] CO 1 BL I, II
 (ii) Explain the following reaction pathways with mechanism.



- Q.1(b) (i) Describe the easy deportation of 9-fluorenylmethyl carbamate (Fmoc) protection for amine with mechanism and include its advantages. [2+3] 1 II, III
 (ii) Write the mechanism of deportation of tertiary butyl carbamate protection for amine and give the disadvantages of the protecting group.
- Q.2(a) (i) Describe the photosensitization mechanism with the help of arbitrary energy diagram. [2+3] 2 III, IV
 (ii) Explain that stilbene isomerization results cis:trans ratio as 85:15 for photosensitized by pyrene (T1= 47 Kcal/mole) but 0:100 for photosensitized by eosin (T1= 43 Kcal/mole).
- Q.2(b) (i) Draw the possible products obtained for the following reaction with mechanism [3+2] 2 IV



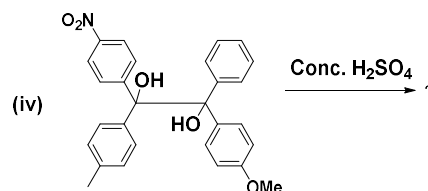
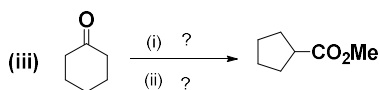
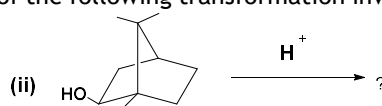
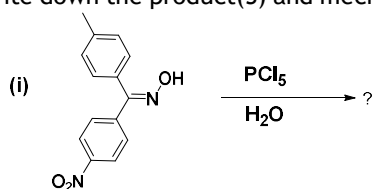
- (ii) Complete the following reaction and include mechanism for each step



- Q.3(a) (i) Compare and contrast the order of stability of following group of radicals; [3+2] 3 II, IV
 $\text{CH}_3\cdot$, $\text{RCH}_2\cdot$, $\text{R}_2\text{CH}\cdot$, $\text{R}_3\text{C}\cdot$ and $\text{CH}_3\cdot$, $\text{FCH}_2\cdot$, $\text{F}_2\text{CH}\cdot$, $\text{F}_3\text{C}\cdot$
 (ii) Describe the method of thermal radical initiation of AIBN.
- Q.3(b) (i) The photochemical bromination of 2-methylbutane is more stereo-selective than that of the chlorination—explain the statement after showing all the possible products. [2+1+2] 3 I, III
 (ii) Establish the mechanism of photochemical aromatic substitution with evidences.
 (iii) What happens when $\text{PhCMe}_2\text{CH}_2\text{CHO}$ heated with di-tertiary-butyl peroxide initiator?

PTO

Q.4 Write down the product(S) and mechanism of the following transformation involves. [2.5x4] 4 III, IV



Q.5(a) (i) Draw the mechanism for the hydrogenation of olefins catalyzed by Wilkinson's catalyst with a suitable example. label each step. [3+2] 5 II, III

(ii) Give an example and show the mechanism of ring closing metathesis reaction using Grubbs catalyst.

Q.5(b) (i) Draw the complete catalytic cycle for the Pd-catalyzed Stille coupling reaction. Clearly label each step with a suitable example, draw the appropriate reagents and products, and show the oxidation state of the Pd species in each step. [3+2] 5 I, III

(ii) What are the differences between Kumada and Suzuki coupling reactions.

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