

M.Sc. DEGREE EXAMINATION, NOVEMBER 2008
BRANCH IV- CHEMISTRY
THIRD SEMESTER

REG.NO

COURSE: MAJOR CORE

PAPER : SYNTHETIC ORGANIC CHEMISTRY

TIME : 30 MINUTES

MAX.MARKS : 20

SECTION – A (20x1=20)

ANSWER ON THE QUESTION PAPER ITSELF.

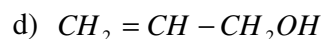
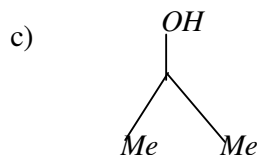
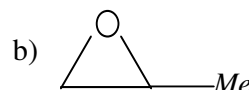
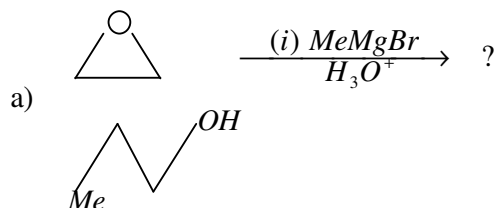
Answer all the questions.

I. Choose the correct answer:

1. DCC is used in organic syntheses as

- a) oxidizing agent
b) reducing agent
c) dehydrating agent
d) hydroxylating agent

2. What is the product in the following reaction?



3. Which reaction is catalysed by Wilkinson's catalyst?

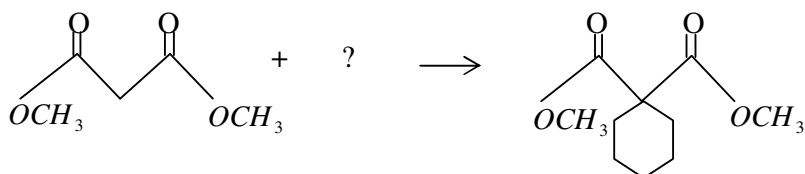
- a) Oxidation of aldehydes. b) Hydrogenation of alkenes
c) Oxidation of alkenes d) Dehydrogenation of cyclic compounds.

4. What are the reagents used in Sharpless asymmetric epoxidation?

- a) Tert-butyl hydroperoxide, a titanium (IV) metal catalyst and a tartrate ester ligand.
b) Tert-butyl hydroperoxide and a vanadium (V) catalyst
c) m-chloroperbenzoic acid.
d) Perbenzoic acid

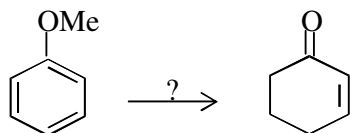
5. What is the synthetic equivalent of the synthon, $\begin{matrix} +\text{C}=\text{O} \\ | \\ \text{OH} \end{matrix}$?
- a) HCHO b) CO₂ c) HCOOH d) CH₄

6. Fill in the blank with an appropriate reactant.



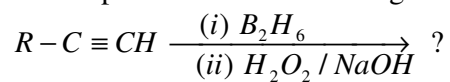
- a) b) c) Br(CH₂)₅Br d)

7. How will you achieve the following conversion?



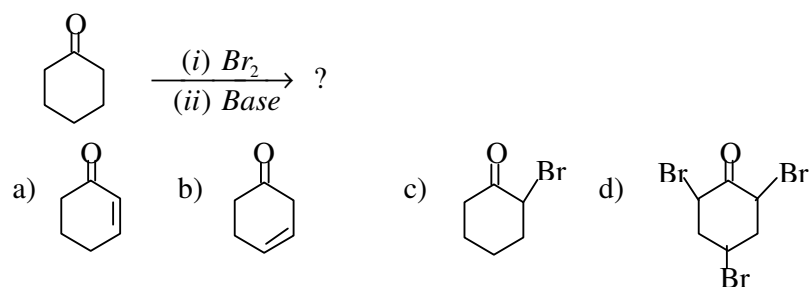
- a) (i) Na / Liq NH₃ b) (i) H₃O⁺ / Δ
(ii) H₃O⁺ / Δ (ii) CrO₃ / AcOH
- c) (i) K₂Cr₂O₇ d) (i) CrO₃ / AcOH
(ii) HOH (ii) H₂/Ni

8. Predict the product for the following reaction.



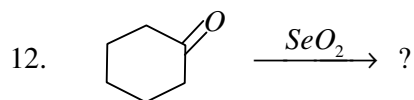
- a) $\begin{matrix} R-C=CH_2 \\ | \\ OH \end{matrix}$ b) $R-CH=CH-BH_2$
- c) $\begin{matrix} R-C=CH_2 \\ | \\ BH_2 \end{matrix}$ d) RCH_2CHO

9. What is the product for the following reaction?



10. How many enantiomers are possible for menthol?
 a) 6 b) 8 c) 4 d) 2

II. Fill in the blanks :



13. Synthons having reversed polarity are known as _____ synthons.
14. The synthetic equivalent of the synthon, $^+CH_2CH_2OH$ is _____.
15. Addition of Br_2 to methyl acetylene to form trans - 1,2 - dibromo propene predominantly is a stereo _____ reaction.

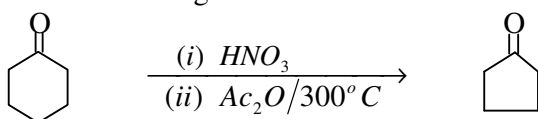
III. Answer the following in one or two sentences :

16. How does a phase transfer catalyst function?
17. How is an aldehyde group protected?

18. Give the structure of Thymol and identify whether it is optically active.

19. How will you prepare a trans diol from an olefin?

20. Explain the following reaction.



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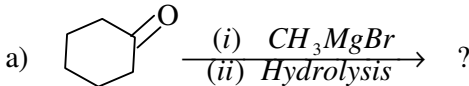
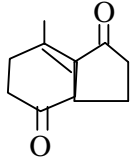
TIME : 2½ HOURS

MAX.MARKS : 80

SECTION – B

(5x8=40)

Answer any five questions:

- Discuss the synthetic application of the following reagents.
a) LDA b) OsO₄ (4+4)
- Predict the product and explain with mechanism.
a)  $\xrightarrow[\text{(ii) Hydrolysis}]{\text{(i) } CH_3MgBr}$?
b) $PhOCH_2 - \underset{\substack{| \\ OH}}{CH} - CH_2OH \xrightarrow{Pb(OAc)_4} ?$
c) $RCOOH + R'OH \xrightarrow{DCC} ?$ (2+2+4)
- a) Explain giving two examples, the need for protecting groups in organic syntheses.
b) How are the following groups protected and deprotected?
(i) –NH₂ (ii) –COOH (4+4)
- Find out the synthetic equivalents after doing proper retrosynthetic analysis of the following target molecule and then show the forward synthesis using Michael condensation.
 (8)
- Discuss the synthesis of Atropine (8).
- How will you synthesize the following?
a) m – Nitrotoluene from toluene
b) n – Nitroaniline from aniline (4+4)
- a) Discuss the synthetic applications of NBS.
b) Outline the synthesis of Menthol. (4+4)

SECTION – C

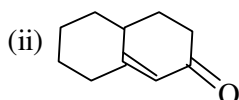
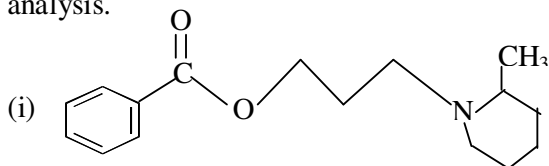
Answer any two questions.

(2x20=40)

8. a) Discuss the synthetic applications of Grignard's reagent and organo copper reagents.

b) Give an account of selective aldol condensation. (10+10)

9. a) Show the forward synthesis of the following target molecules with retro analysis.



b) Outline the synthesis of Longifolene. (10+10)

10. a) Write notes on
(i) Crown ether

(ii) Lithium aluminium hydride

c) Outline the synthesis of the oxefane ring, D of Taxol.

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STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI-86
(For candidates admitted during the academic year 2004 –05 & thereafter)

SUBJECT CODE: CH/PC/SO34

M.Sc. DEGREE EXAMINATION, NOVEMBER 2006
BRANCH IV- CHEMISTRY
THIRD SEMESTER

REG.NO

COURSE: MAJOR CORE

SECTION – A

(20x1=20)

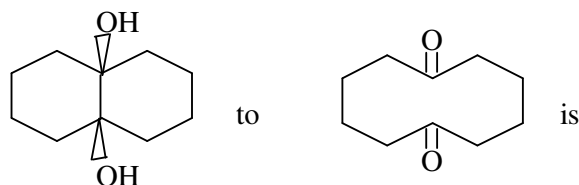
ANSWER ON THE QUESTION PAPER ITSELF.

Answer all the questions.

IV. Choose the correct answer:

1. 1,5 dicarbonyl compound can be synthesized using
 a) Aldol reaction b) Michael reaction
 c) Ozonolysis reaction d) Reformatsky reaction.

2. The reagent used for the conversion of



- a) SeO_2 b) Lead tetra acetate c) PCC d) OsO_4

3. Conversion of $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OH}$ to $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{R}'$ can be achieved using
 a) $\text{R}'\text{MgX}$ b) $\text{R}'\text{Li}$ c) $\text{R}'_2\text{CuLi}$ d) $\text{R}'_2\text{Cd}$

4. Which is the electrophilic reagent used in Wittig reaction.
 a) Phosphorus ylide b) Carbonyl Compound
 c) Olefin d) Alkyl halide

5. Conversion of to is achieved using

- a) DCC b) Bu_3SnH c) $(\text{CH}_3)_3\text{SiI}$ d) Lewis acid

6. Diphenyl acetylene can be reduced to cis-stilbene by using

- a) Wilkinson Catalyst b) NaNH_2 / liquid NH_3
 c) H_2 / Ni d) all the above reagents

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CH/PC/SO34

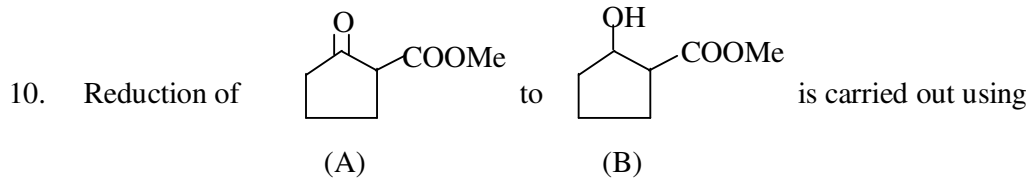
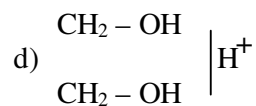
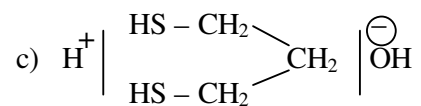
7. Number of chiral centres in Taxol is
 a) 12 b) 11 c) 4 d) 5

8. Cyclohexane derivatives are synthesized by
 a) Michael reaction b) Diels – Alder reaction
 c) aldol reaction d) none of the above

9. Umpolung on carbonyl is achieved using

a) RMgX

b) R_2CuLi



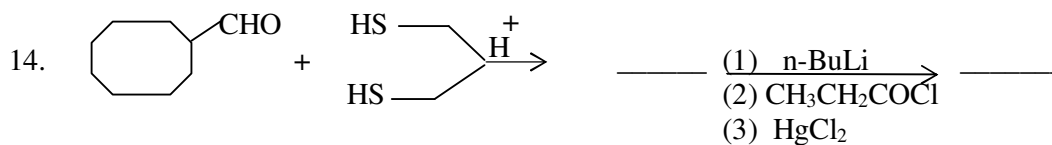
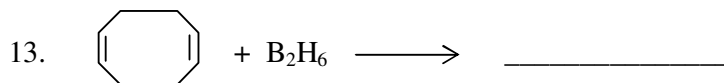
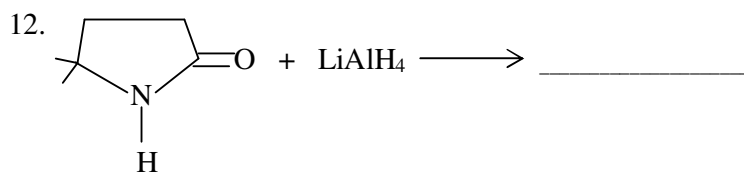
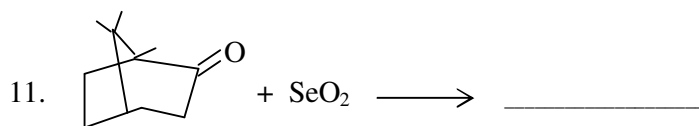
a) Diborane

b) Lithium aluminium hydride

c) Dibal

d) Wilkinson's Catalyst

V. Fill in the blanks :



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/3/

CH/PC/SO34

VI. Answer the following in one or two sentences :

15. Give two uses of Thymol.

16. Write the structure of Rutin.

17. Explain umpolung with an example.

18. Give an example of Phase – transfer catalyst.

19. Mention any one physiological action of digoxin.



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TIME : 2 HOURS & 40 MINUTES

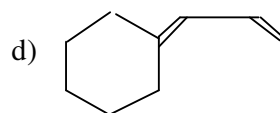
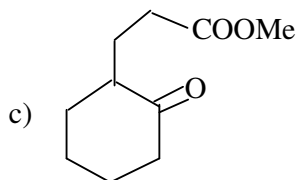
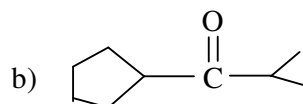
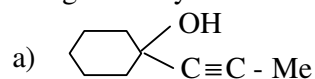
MAX.MARKS : 80

SECTION - B

(5x8=40)

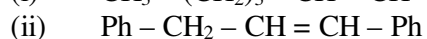
Answer any five questions:

1. Suggest suitable starting materials for the synthesis of the following compounds using Retro-synthetic analysis.



(4x2=8)

2. a) Using Suzuki reaction how are the following compounds synthesized ?

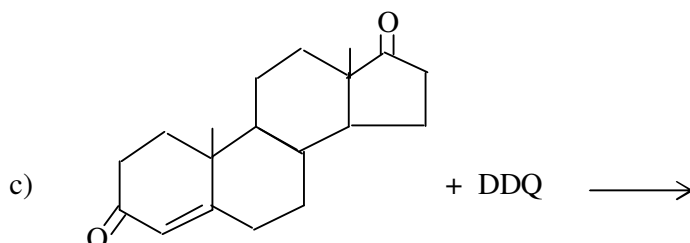
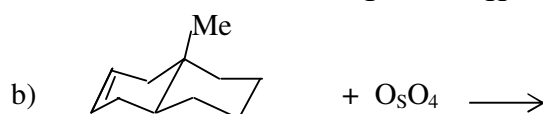
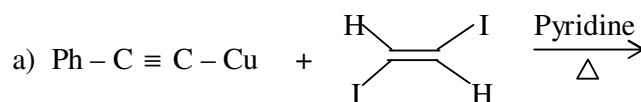


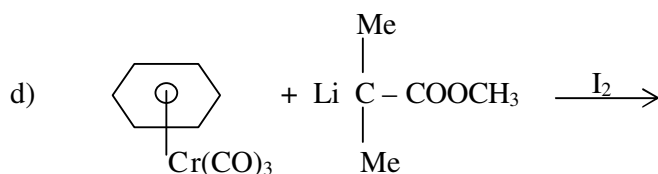
(2x2=4)

- b) Bring out the synthetic utility of DCC in protein synthesis.

(4)

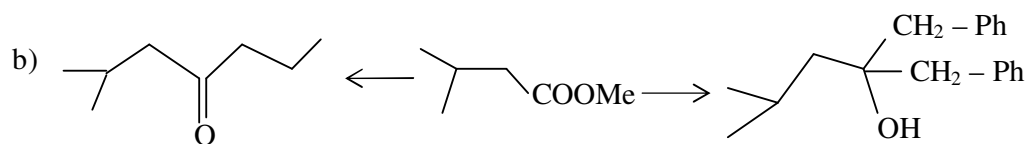
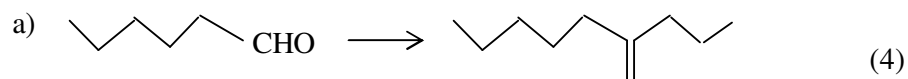
3. Complete the following reactions





(4x2=8)

4. How would you effect the following conversions ?



(2+2=4)

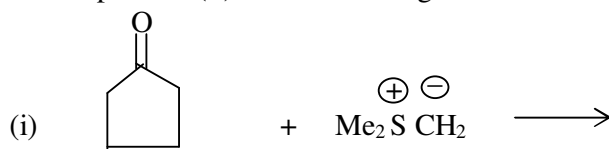
5. Explain briefly protection and deprotection methods for carboxyl group and hydroxyl group.

(4+4)

6. a) How is chirally pure menthol synthesized ?

(4)

b) Predict product (S) in the following reaction.



7. Suggest methods for the synthesis of the following bifunctional compounds.

a) β - hydroxy ketone

b) β - keto ester

c) α - hydroxy ester

d) 1, 4 diketone

SECTION – C

Answer any two questions.

(2x20=40)

8. a) Describe the synthesis of Atropine. (10)
b) Mention the synthetic application of the following compounds in organic synthesis
(i) Ionic liquids (ii) Wilkinson's Catalyst
(iii) Crown ethers (iv) $(\text{CH}_3)_3\text{SiI}$ (v) SeO_2
(5x2=10)
9. a) Explain how McMurry Coupling and Shapiro Coupling remain useful in Taxol synthesis (10)
b) Discuss briefly Mukaiyama reaction. (5)
c) Explain with an example how activation of functional group helps in organic synthesis (5)
10. a) Discuss the role of titanium tetra isopropoxide in achieving stereo – selective epoxidation. (5)
b) Write briefly on the following :
(i) BH_3SnH in organic synthesis
(ii) Michael reaction
(iii) Pyridinium chlorochromate
(iv) Role of any transition metal in organic synthesis. (4+4+3+4)

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