Total No. of Questions : 6]

SEAT No. : ____

PC-3810

[Total No. of Pages : 6

[6338]-301

M.Sc.

DRUG CHEMISTRY

CCTP-7 CHD360 : Advanced Analytical Methods

(2019 Pattern) (Semseter - III)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right side indicate full marks.***
3) ***Answer to the two sections should be written in separate answer books.***

SECTION - I

Q1) a) Answer the following (any four) : **[8]**

i) Explain the use of shift reagents in simplification of complicated PMR spectra.

ii) Each of the following gives only one signal in its PMR spectrum propose a structure for each.

a) C_3H_6O

b) C_5H_{10}

iii) The mass spectrum of 1-butanol shows peaks at m/e-56 and 31. Explain.

iv) A compound with a molecular formula C_6H_8 shows only two signals in its CMR spectrum. DEPT shows presence of CH and CH_2. Assign probable structure.

b) Deduce the structure. **[3]**

Elemental Analysis : - O = 64.3% and H = 8.8%

IR - 1195, 1670, 1620 cm^{-1}

Mass : - 114, 99, 86, 69, 41

PMR - 1.3 (t, 7Hz, 3H), 2.0(d, 7Hz, 3H),
4.2 (9, 7Hz, 2H), 5.8(d, 16Hz, 1H)
6.9 (da, 16 & 7Hz, 1H)

P.T.O.

Q2) Deduce the structure (any four) : **[12]**

a) MF : - $C_6H_5Br_2N$

IR : - 3420, 3315, 1612 cm^{-1}

PMR : - 4.5 (bs, 2H), 6.4 (t, 7.5 Hz, 1H), 7.3 (d, 7.5 Hz, 2H)

CMR : - 109, 119, 132, 142

DEPT 1 : - 109, 142, absent. 119, 132 up

DEPT 2 : - 109, 142, absent. 119, 132 up

b) MF : - $C_6H_6N_2O$

CMR : - 121.3 (d), 126.0 (s), 133.3 (d), 144.8 (d), 148.9 (d) 166.6(s)

Mass : - m/e - (M^+) - 122, 106, 78, 51, 44

c) MF : - $C_7H_{14}O_2$

Mass : - 130, 115, 100, 73, 43

CMR : - 208(s), 75 (s), 54 (t), 50 (q), 33 (q), 25 (q, str)

PMR : - 1.3 (s, 6H), 2.2(s, 3H), 2.5 (s, 2H), 3.2 (s, 3H)

d) MF : - $C_6H_{10}O_3$

CMR : - 54.1 (q, strong), 107.1 (d, strong) 131.2 (d, strong)

PMR : - 3.38 (s, 6H), 5.58 (d, 2.4 Hz, 2H),

6.07 (d, 2.4 Hz, 2H).

e) MF : - $C_9H_{14}O$

Mass : m/e - 138, 95 (100%), 81, 79

IR : - 3290, 2115, 1710 cm^{-1}

PMR : - 1.12 (s, 6H), 2.02 (t, 1H, 3 Hz), 2.15(s, 3H), 2.20 (d, 2H, 3Hz), 2.50 (s, 2H)

Q3) Write short notes on any four of the following : **[12]**

a) Factors affecting geminal coupling

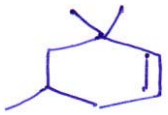
b) AB and AX spin systems

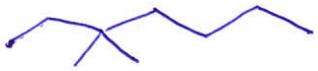
c) 2 D - NMR

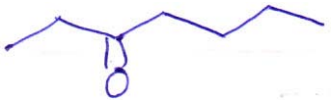
d) Factors affecting mass fragmentation

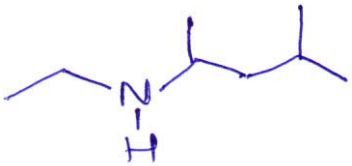
e) DEPT technique

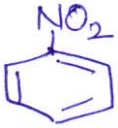
Q4) a) Give the genesis of fragments for any four of the following : **[8]**

i)  m/e 124, 109, 95, 82, 67

ii)  m/e 113, 99, 57, 55, 43

iii)  m/e 114, 85, 72, 57, 41

iv)  m/e 129, 114, 72, 58, 44, 30

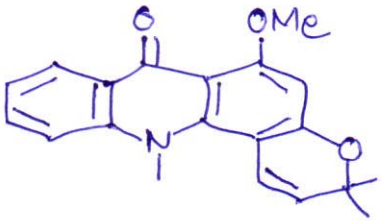
v)  m/e 123, 93, 65, 77, 51

b) Differentiate following pairs of compounds by spectral techniques : **[3]**

i) 

ii) 

Q5) a) Assign the signals to the various carbon atoms in the following compound. Justify your answer **[6]**



27.3(q), 36.3(q), 57.4(q),

81.1(s), 94.3(d), 107(s),

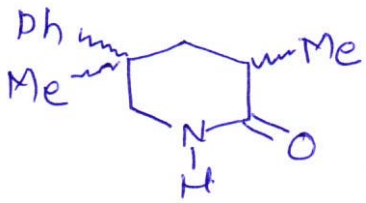
111.3(s), 117(d), 121(d),

122.7(d), 125(d), 12 7.4(s),

134(d), 142.3(s), 144(s),

159.9(s), 162.3(s), 181(s)

b) Assign the signals to various protons in following compound. Justify your answer. Using PMR data draw the stereostructure for the same **[6]**



3.5(1H, d, J = 12Hz)

3.3(1H, dd, J = 12 & 2Hz)

2.6(1H, ddq, J = 12, 6 & 7Hz)

2.1(1H, ddd, J = 13, 6 & 7Hz)

1.8(1H, dd, J = 13 & 12Hz)

1.4(3H, s)

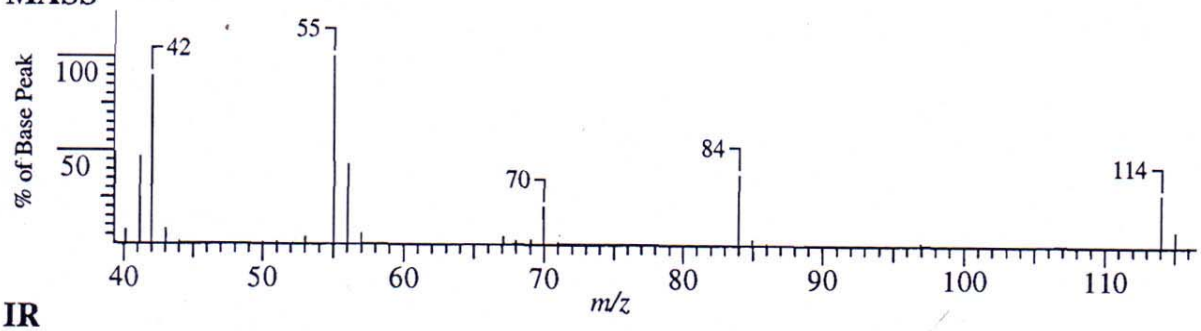
1.3(3H, d, J = 7Hz)

i) Irradiation of 1.3 changes signal at 2.6 into dd, J = 12 & 6 Hz.

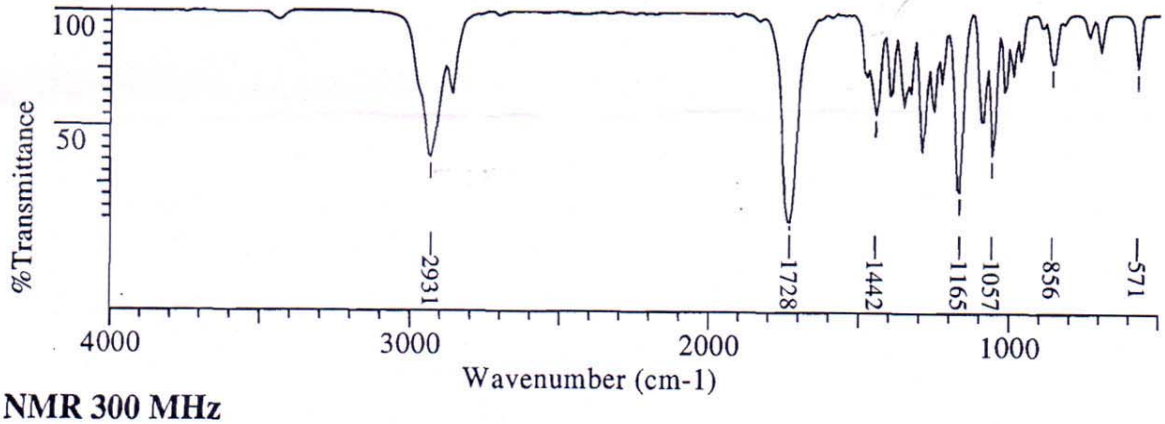
ii) Irradiation of 2.1 gives a small enhancement at 1.4.

Q6) Deduce the structure of an unknown compound using spectra attached on next pages. justify your answer. **[12]**

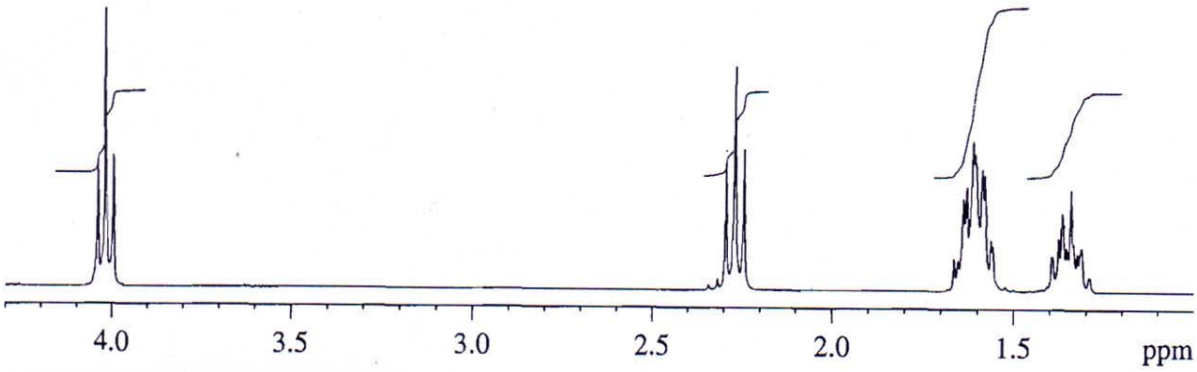
MASS



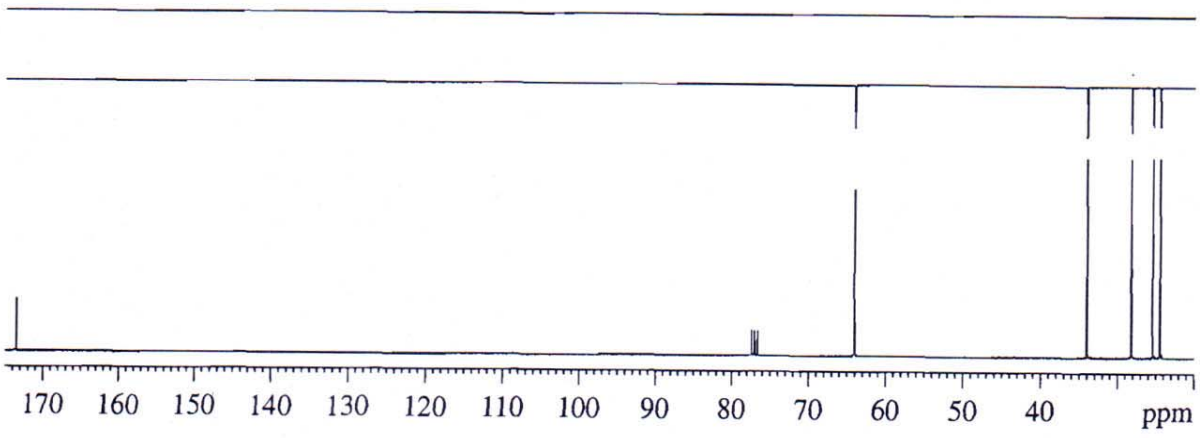
IR

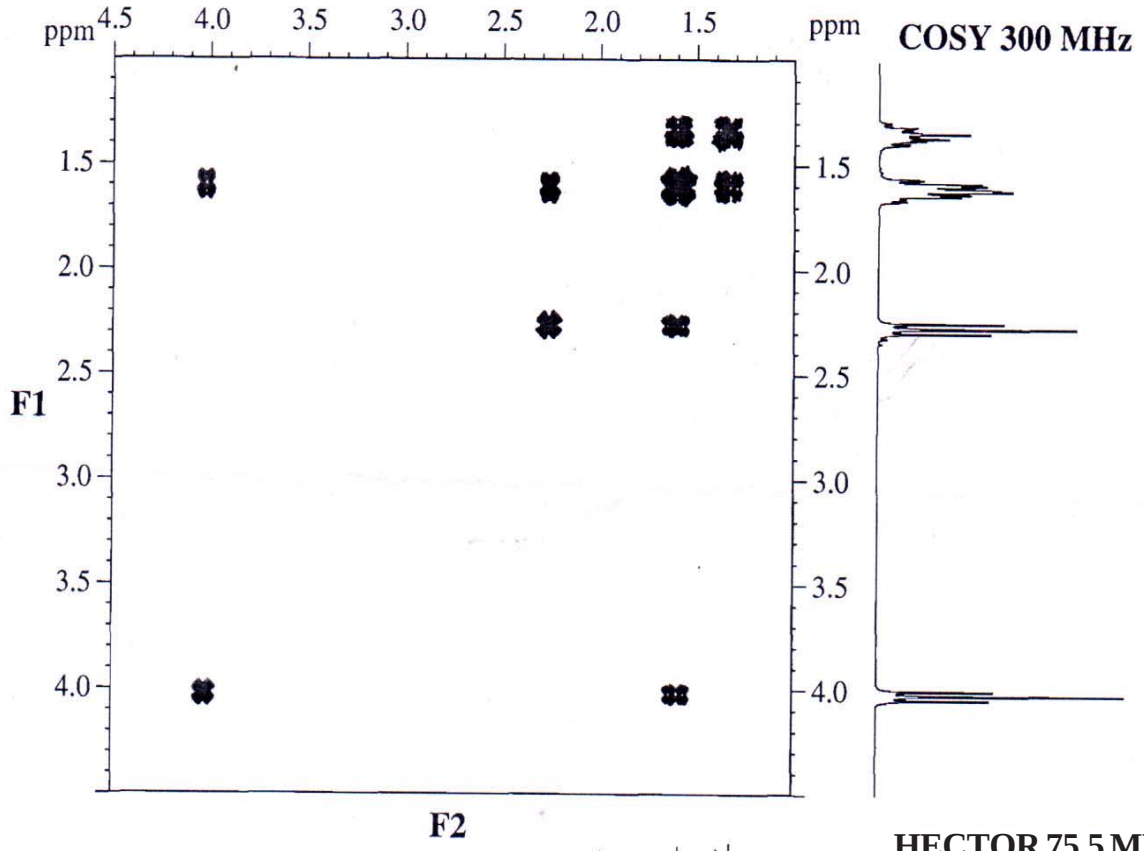


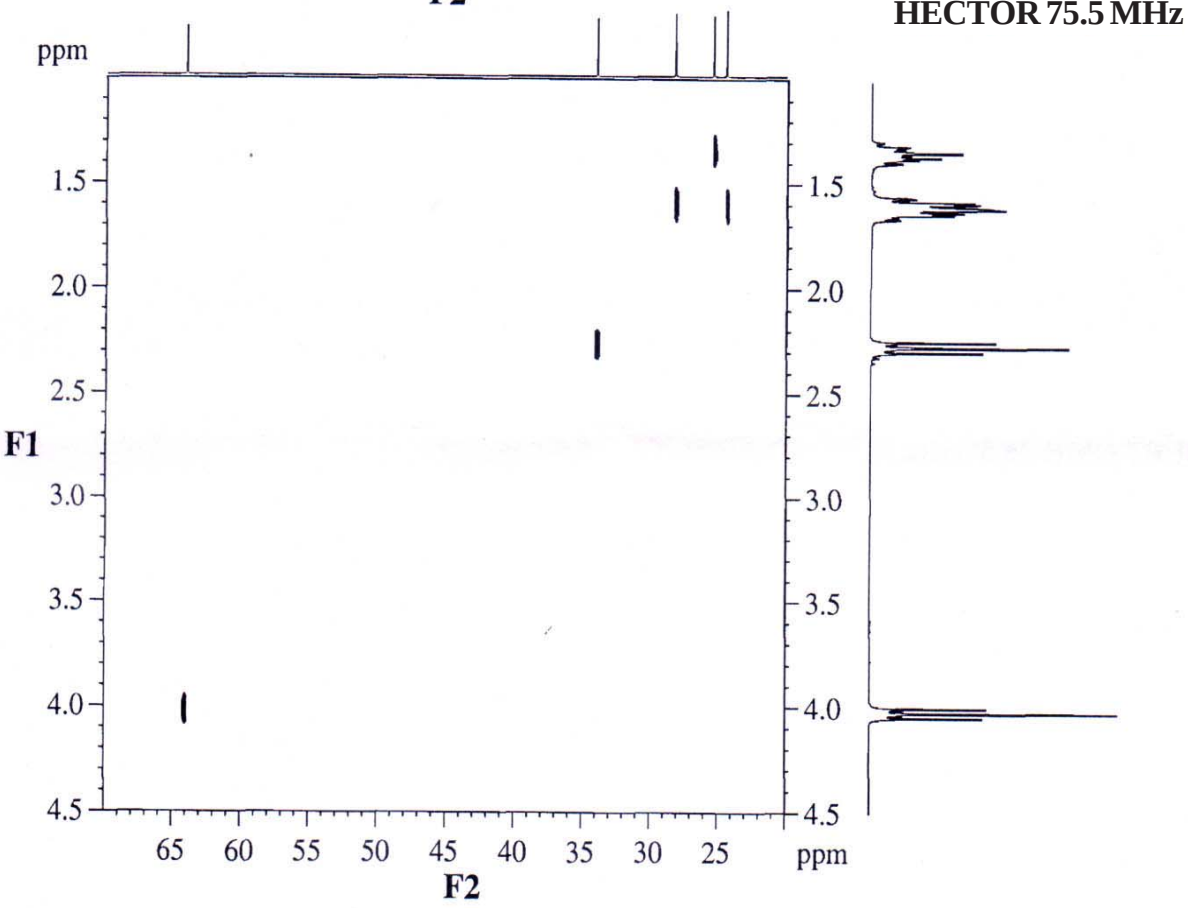
^{1}H NMR 300 MHz



^{13}C/DEPT NMR 75.5 MHz




COSY 300 MHz
ppm
4.5
4.0
3.5
3.0
2.5
2.0
1.5
ppm
F1
F2


HECTOR 75.5 MHz
ppm
F1
F2
65
60
55
50
45
40
35
30
25
ppm

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Total No. of Questions : 6]

SEAT No. : ____

PC3811

[Total No. of Pages : 2

[6338]-302
S.Y.M.Sc.
DRUG CHEMISTRY
CCTP - 8 CHD - 361 : Drug Discovery and Development
(2019 Pattern) (Semester - III)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answer to the two sections should be written in seperate answer books.***
3) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Define the following. **[8]**

i) LD_{50}

ii) Therapeutic index

iii) Lead

iv) Drug target

b) Give a commentary on how combinatorial chemistry, HTS and computers have aided the process of drug discovery. **[3]**

Q2) Answer any one of the following. **[6]**

a) i) Give all the parameters used to study toxicological evaluation of new drugs.

ii) Define dosage forms. Discuss the liquid dosage forms with examples.

b) Discuss how the achive ingradients are isolated from the following sources with examples. (any two) **[6]**

i) Plant

ii) Microbial

iii) Animal

P.T.O.

Q3) a) Answer any one of the following. **[6]**

i) Discuss the following system of medicines.

1) Unani

2) Siddha

ii) Define pharmacodynamics and pharmacokinetics. What are the factors that affect the pharmacokinetics of drug action.

b) Write a short note on (any two) **[6]**

i) FDA

ii) Carbohydrates as a drug target.

iii) Proteins as a drug target.

SECTION - II

Q4) a) Define the following. **[8]**

i) Novelty

ii) Patentable inventions

iii) Infringement

iv) Prior art

b) What is Bioavailability? Give it's types in detail. **[3]**

Q5) a) Answer any one of the following questions. **[6]**

i) What is patent? Give it's Basic and formal requirement of patent.

ii) What is Bioassays? Explain need of Bioassays. Give in detail the types of Bioassays.

b) Discuss the following: (any two) **[6]**

i) GMP

ii) Scale up process

iii) Preclinical testing

Q6) Answer any of the following questions. **[6]**

a) i) Give an account of strategies involved in drug discovery.

ii) Define Bioequivalence and Bioavailability. Explain the objectives of Bioavailability.

b) Write short note on. (any two) **[6]**

i) Documentation.

ii) Pharmacophore identification.

iii) Pilot plant.

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Total No. of Questions : 6]

SEAT No. :

PC3812

[Total No. of Pages : 5

[6338]-303

M.Sc. - II

DRUG CHEMISTRY

CCTP-9-CHD-362 : Stereochemical Principles and Applications

(2019 Pattern) (Semester-III)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

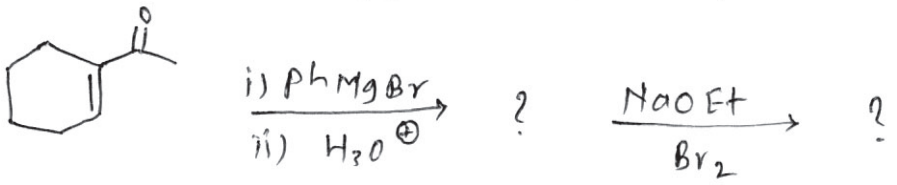
1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Answers to the two sections should be written in separate answer books.***

SECTION-I

(Stereo Chemistry)

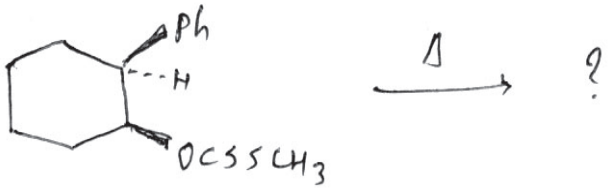
Q1) a) Predict the product of the following and explain the stereochemical principles involved. **[8]**

i)



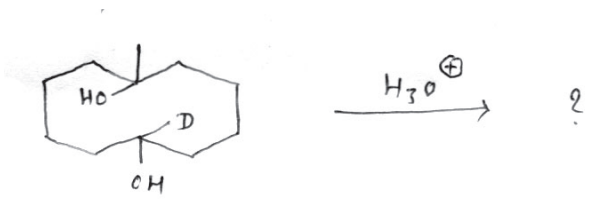
ii)

iii)



P.T.O.

iv)



b) Half number of enantiomers are observed in case of bridge ring systems. **[3]**

Q2) a) Answer any two of the following. **[6]**

i) Trans-4-t-butyl cyclohexanol is more strongly adsorbed on alumina than cis isomer. Explain.

ii) Write a short note on Von Auwer's-skita rule.

iii) Explain with examples-transannular interactions.

b) Answer any two of the following. **[6]**

i) Write a note on I-strain.

ii) Write a note on 'Bredt's rule'.

iii) Which form of Bicyclo [3, 3, 1] nonane is more stable? Why?

Q3) a) Answer any two of the following. **[6]**

i) Write a note on Thalidomide.

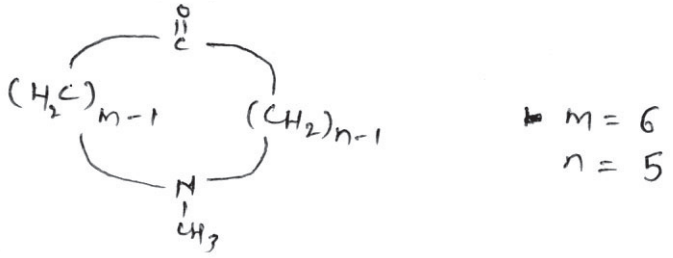
ii) Explain 2-Alkyl-ketone effect.

iii) Chair-boat interconversion is more tacile in cyclohexanone than in cyclohexane.

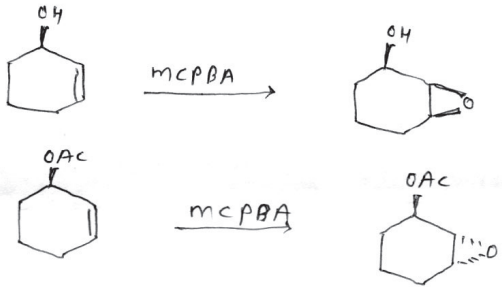
b) Explain the following. (any two) **[6]**

i) Dehydrohalogenation reaction of neomenthyl chloride and menthyl chloride with base. Explain.

ii) In the IR spectra of following aminoketone the carbonyl absorption around 1700cm^{-1} disappears on protonation.



iii)

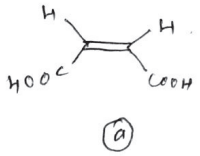


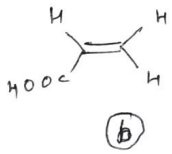
SECTION-II

(Principles and Applications of Asymmetric Synthesis)

Q4) a) Attempt the following: **[8]**

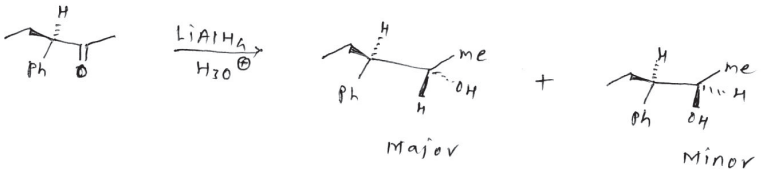
i) Assign Re/Si configuration of each hybridized carbon in following compound.



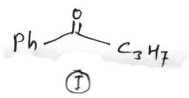


ii) Explain the concept of natural pool strategy, with suitable example.

iii) Using Felkin rule, explain the following transformation.



iv) Write the products by hydride attack from Re and Si faces on compounds (I). Give the relation between two products.



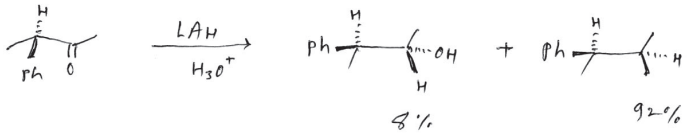
b) Write a short note on 'Crams rule' and its modification. **[3]**

Q5) a) Explain the following (any two). **[6]**

i) Explain use of chiral solvation agents.

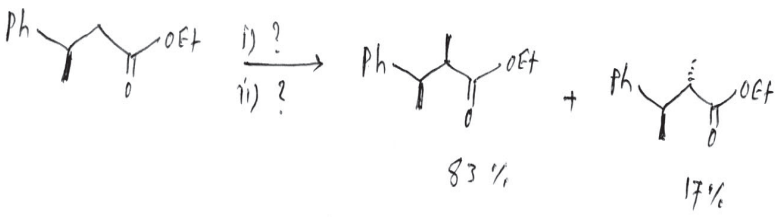
ii) Give the comparison between chiral auxillary and catalyst. Give the synthesis of David Evan's Auxillary.

iii) Explain diastereomeric excess (de). Calculate the de of the following reaction.

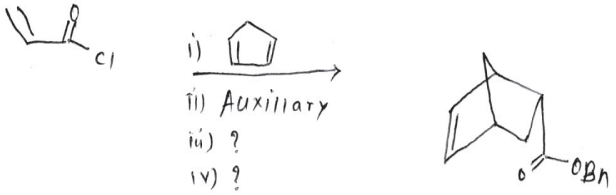


b) Suggest the reagent and write mechanism of the following reactions. (any two) **[6]**

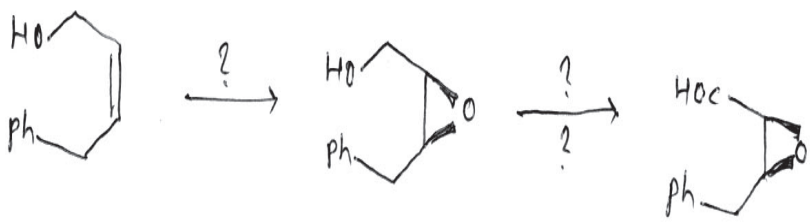
i)



ii)

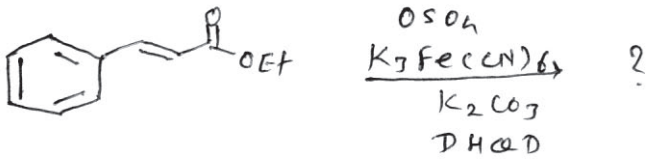


iii)

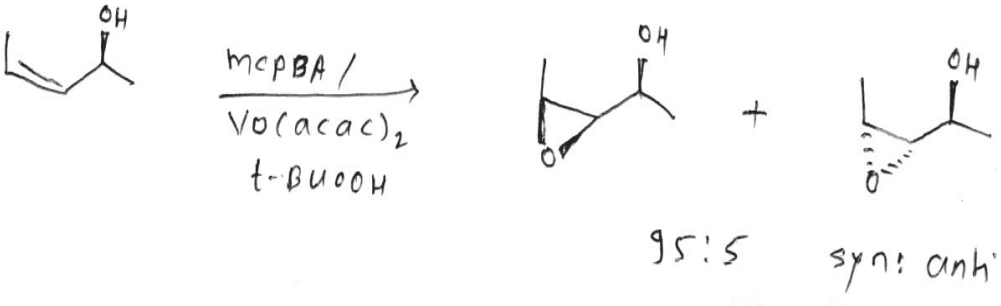


Q6) a) Explain any two of the following: **[6]**

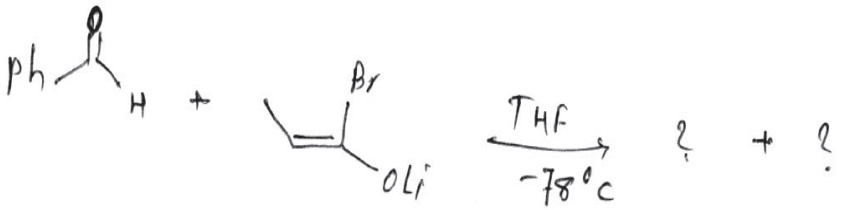
i) Predict the product of the following reaction with stereochemistry.



ii) Explain the observation.



iii) Predict the product with stereochemistry and explain the formation of major product.



b) Write a short note (any two). **[6]**

i) Cram's chelate model

ii) Sharpless asymmetric epoxidation

iii) Concept of natural pool strategy

Total No. of Questions : 6]

SEAT No. :

PC3813

[Total No. of Pages : 6

[6338]-304

M.Sc. (Part - II)

DRUG CHEMISTRY

CHD-363(A) : Chemistry of Heterocycles and Biologically Active Molecules

(2019 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Answer to the two sections should be written in separate answer books.***

SECTION - I

Q1) a) Explain the following : **[8]**

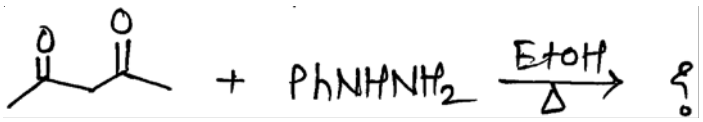
i) Benzofuran shows electrophilic substitution exclusively at the 2-position but indole at 3-position.

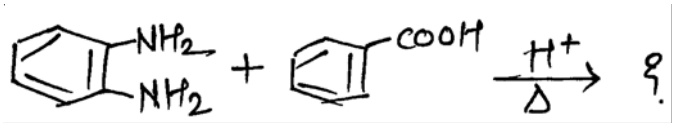
ii) Oxazole is less basic than imidazole.

iii) 4-Chloropyridine easily undergoes hydrolysis in harm water.

iv) Quinoline undergoes reduction more easily than naphthalene.

b) Predict the products in the following : **[3]**

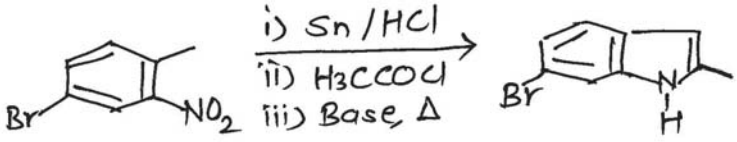
i) 

ii) 

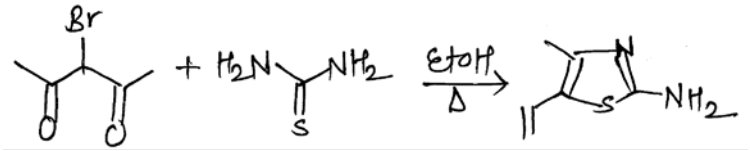
P.T.O.

Q2) a) Suggest the suitable mechanism for any one of the following. **[6]**

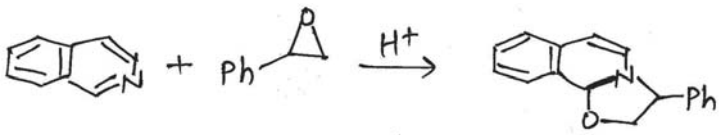
i) 1)



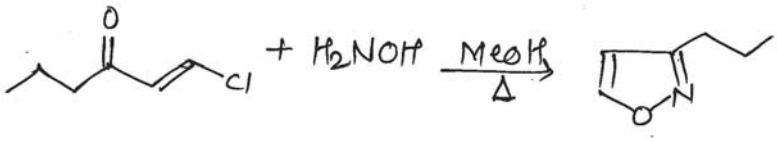
2)



ii) 1)



2)



b) Write notes on any two of the following : **[6]**

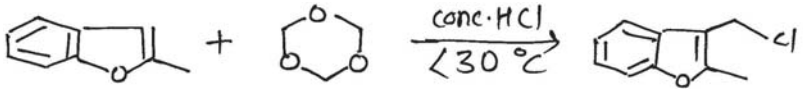
i) Bischler - Napieralski Isoquinoline synthesis.

ii) Madelung Indole synthesis.

iii) Skraup Quinoline Synthesis.

Q3) a) Suggest the suitable mechanism for any one of the following. **[6]**

i) 1)



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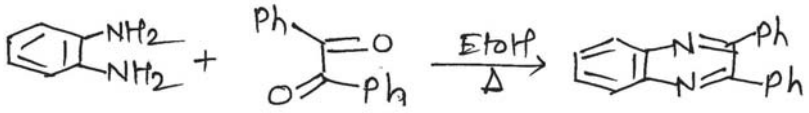
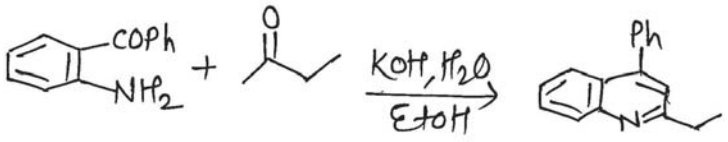


ii) 1)



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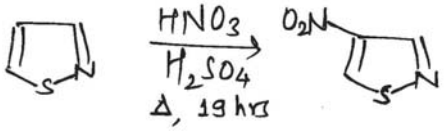
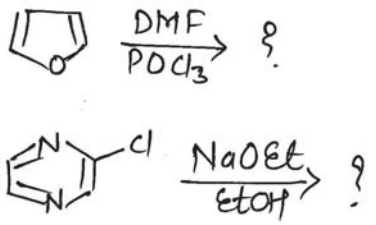


b) Answer any two of the following : **[6]**

i) Imidazole is stronger base than pyridine. Explain.

ii) Write short note on Fischer Indole synthesis.

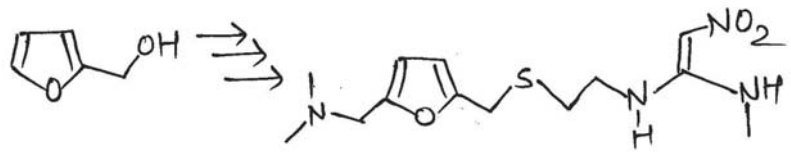
iii) Predict the products.



SECTION - II

Q4) a) Describe the steps involved in the synthesis of following drug molecules. Explain the mechanism involved. **[8]**

i)



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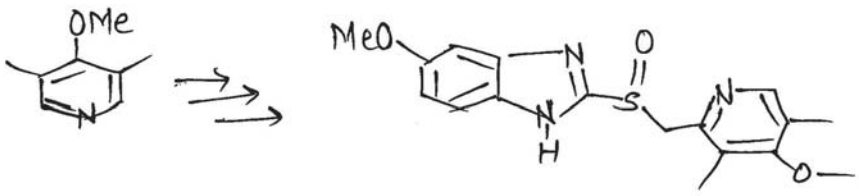

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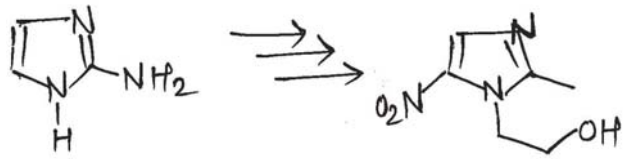

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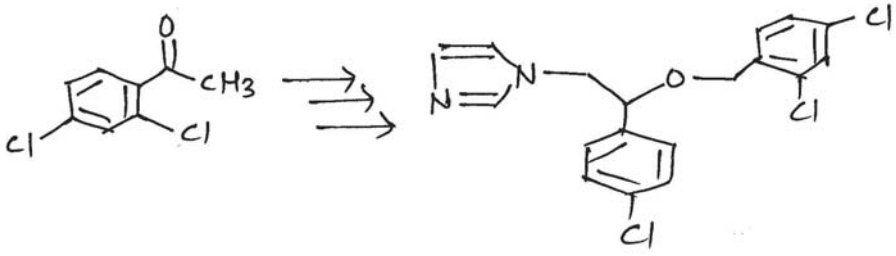
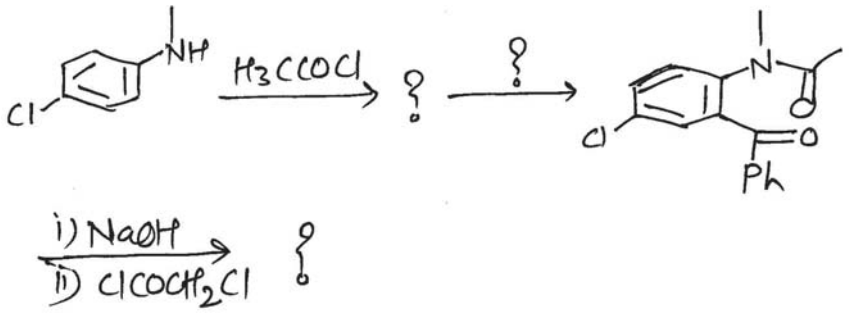
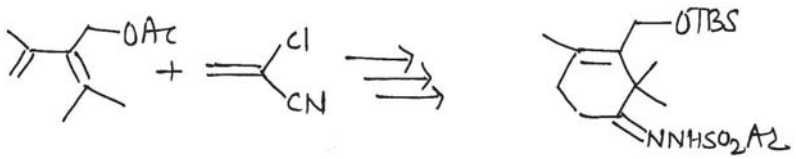


b) Insert the missing reagents in the following sequence of reactions. Explain the steps with mechanism. **[3]**



Q5) a) Discuss the steps involved in the synthesis of the following molecules. Explain the stereochemistry & mechanism involved (any one) **[6]**

i) 1)



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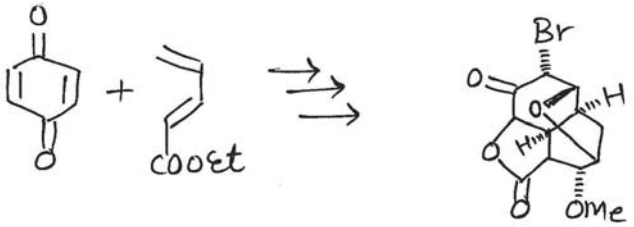
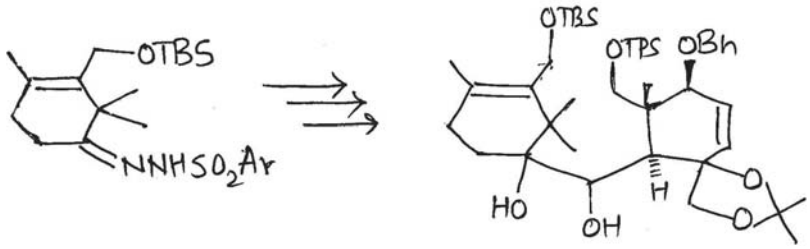


ii) 1)



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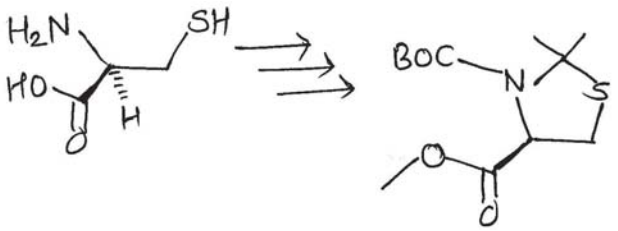
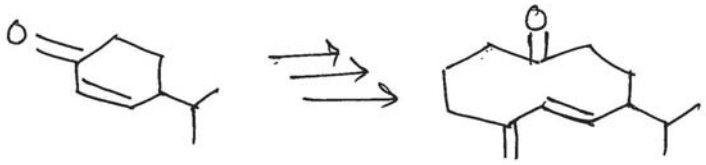


b) Discuss the steps involved in the synthesis of the following molecules. Explain the stereochemistry and mechanism involved (any two) **[6]**

i)



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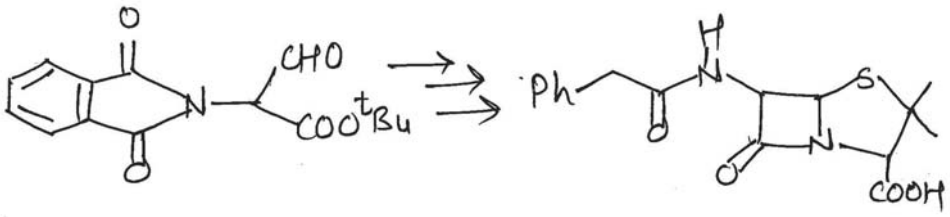

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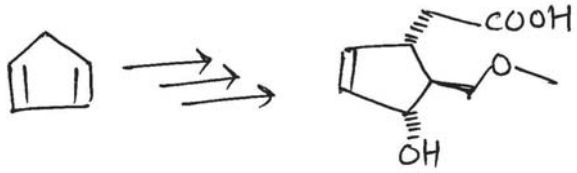
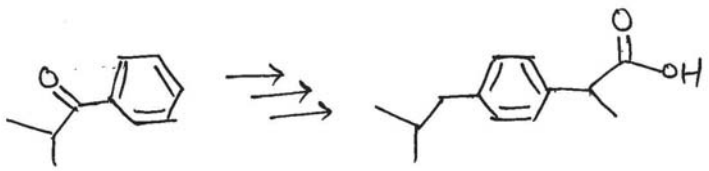


Q6) a) Explain the steps involved in the synthesis of following drug molecules. Explain the mechanism involved (any one) **[6]**

i) 1)



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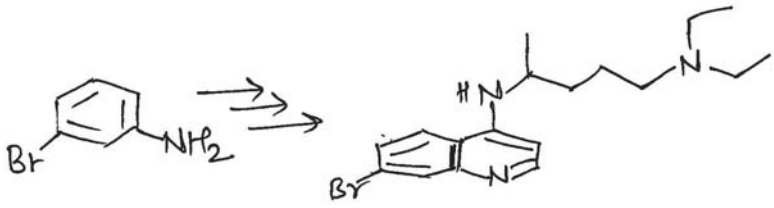
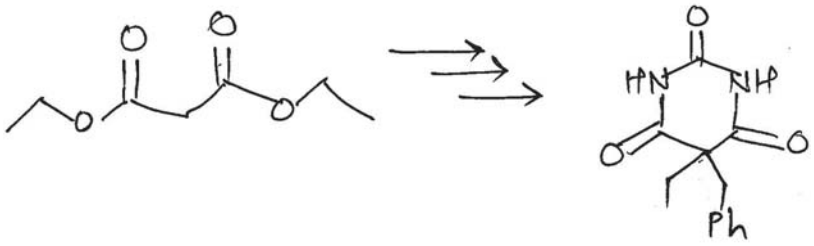


ii) 1)



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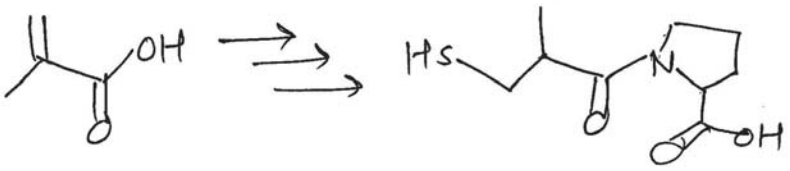


b) Write short notes on. (any two) **[6]**

i) McMurray pinacol coupling reaction

ii) Gabriel synthesis

iii) Fridel - craft reaction

x x x

Total No. of Questions : 9]

SEAT No. :

PC3814

[Total No. of Pages : 3

[6338]-305

M.Sc. (Part - II)

DRUG CHEMISTRY

CHD-363B : Section - I : Immunology & Microbiology, Section - II : Bioinformatics & Biostatistics in Drug Discovery, Section - III : Entrepreneurship Development

(2019 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Attempt any two of I, II and III sections.***
3) ***Each section is for 35 marks.***
4) ***Figures to the right indicate full marks.***

SECTION - I

(Immunology and Microbiology)

Q1) a) Answer the following : **[6]**

i) Discuss in brief cell mediated and antibody mediated immunity.

ii) What are the methods used for isolation of micro-organism. Describe any one in detail.

b) Write short notes on the following : **[5]**

i) Designing fermentation media.

ii) T and B lymphocytes.

Q2) Answer any three of the following : **[12]**

a) Differentiate between innate and adaptive immunities.

b) What is antimicrobial assay? How it is performed?

c) How bacteria are classified based on requirement of 'c' and energy source.

d) Explain

i) Immunogen

ii) Antibodies

P.T.O.

Q3) Answer any three of the following : **[12]**

a) ELISA

b) Adaptive Immunity

c) Describe the mechanism and symptoms of type-II hyper sensitivity.

d) Explain

i) Industrial strain

ii) Media design

SECTION - II

(Bioinformatics, Biostatistics in Drug Discovery)

Q4) a) Answer the following : **[6]**

i) Explain in brief - Docking.

ii) Write a short note on - Applications of genomics.

b) Explain the terms Negative correlation and chi-square test with their significance. **[5]**

Q5) Answer any four of the following : **[12]**

a) Explain - Gene prediction programs.

b) Define bioinformatics and write note on biological databases.

c) Give the uses and significance of canonical representations in chemoinformatics.

d) Discuss the steps involved in structure based drug designing.

e) Write a note on - proteome analysis of on organism.

Q6) Attempt any three of the following : **[12]**

a) Explain the following

i) Standard deviation

ii) Median

iii) Chi-square test

iv) Coefficient of variation

b) Compute correlation between of import raw material and export of finished product.

Export	10	11	14	20	22	16	12
Import	12	14	15	16	21	26	21

c) Explain the term variance. Calculate variance for the following frequency.

No. of germinated seeds	0	1	2	3	3	2
Total No. of seeds	2	4	6	5	4	5

d) Obtain the median for the following data.

Class	10-15	15-20	20-25	25-30	30-35
Frequency	7	13	17	22	04

SECTION - III

(Enterpreneurship Development)

Q7) a) Answer the following : **[6]**

i) Explain Leibenstein's X - efficiency theory.

ii) Differentiate between Intrapreneur and Enterpreneur.

b) Write short note on the following : **[5]**

i) Danhot's classification of Enterpreneurship.

ii) Conducting feasibility studies.

Q8) Answer any three of the following : **[12]**

a) Discuss in brief entrepreneural search and identification.

b) Make a comment on factors affecting entrepreneural growth.

c) Entrepreneurship does not emerge spontaneously. Explain.

d) What are steps involved in business plan process. Explain in brief.

Q9) Answer any four of the following : **[12]**

a) Write a short note on organization and management.

b) Explain the opportunities for small entrepreneurs in India.

c) Differentiate between manager and entrepreneurs.

d) Profit is the reward of entrepreneur. Explain.

e) Explain the problems faced by women entrepreneur.

Total No. of Questions : 6]

SEAT No. : ____

PC3815

[Total No. of Pages :3

[6338]-401

S.Y.M.Sc.

DRUG CHEMISTRY

CCTP-10 CHD-460 : Advanced Medicinal Chemistry

(2019 Pattern) (Semester- IV)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Answer to the two sections should be written in separate answer books.***

SECTION - I

Q1) a) Discuss the uses and mode of action of the following drug molecules. **[6]**

i) Erythromycin
ii) Dapsone
iii) Amphotericin - B

b) Answer the following: **[5]**

i) Give a brief account of Antibiotic resistance. Discuss the mechanisms involved and the strategies applied to combat resistance.
ii) How are antibiotics discovered ? How do they exhibit antibiotic phenomenon? Explain with examples.

Q2) Answer any four of the following: **[12]**

a) Discuss the development of fluoroquinolones and their role in antibacterial therapy.
b) What is the causative agent for following diseases and give drug of choice to treat it
   i) Candidiasis
   ii) Leprosy
   iii) AIDS
c) What are the strategy to treat
   i) Tuberculosis
   ii) Influenza
d) Explain in brief the uses of Macrolide antibiotics and the development of Azitromycin and Roxitromycin from Erythromycin.
e) What are the different steps in protein synthesis? Give atleast two drugs affecting each step.

P.T.O.

Q3) Answer any three of the following: **[12]**

a) Explain the mechanism of action of β-lactam antibiotics why are these drugs selectively toxic to bacteria?

b) What is the role of CNS? Discuss how it performs the function, explain the electrical and chemical signal transmission. What happens if there is deficiency of neurotransmitters?

c) Explain in brief the role of following classes of drugs in cancer treatment giving their mechanism of action.

i) Alkylating agents

ii) Plant products

d) Give an overview of enzyme inhibitors as drugs with specific examples of anticancer agents, antibiotics and antifungal agent.

SECTION - II

Q4) a) Discuss the following in brief. **[6]**

i) Myocardial Infarction

ii) Arrhythmia

b) Give a brief overview of **[5]**

i) Analgesics

ii) Drug resistance

Q5) Answer any four of the following: **[12]**

a) Describe in brief different types of ulcer. What are the common strategy to treat them.

b) What is the difference between NIDDM and IDDM? Explain the management of NIDDM.

c) Give a short account of plant products used as drugs.

d) Discuss the following in brief

i) Mechanism of cardiac muscle contraction

ii) Renin - Angiotensin pathway

e) How do the following group of drugs affect the CVS

i) Ionotropics

ii) Thrombolytics

Q6) Answer any three of the following: **[12]**

a) Explain negative feed back mechanism & its important role in maintaining homeostasis? Discuss the role of hormones of Adrenal gland? How is their deficiency rectified?

b) Discuss the organisation and functioning of Endocrine system. Explain in brief how harmones affect the growth and maintenance of healthy state of the body. Discuss the function of Pitutary gland.

c) Explain how following group of compounds help in management of diseases.

   i) Anti-coagulants

   ii) Proton pump Inhibitors

d) Explain any two of the following and give Drug of choice to treat it.

   i) Hypertension

   ii) Congestive Heart failure

   iii) AIDS

Total No. of Questions : 6]

SEAT No. :

PC3816

[Total No. of Pages : 2

[6338]-402

M.Sc. - II

DRUG CHEMISTRY

CCTP-11-CHD - 461 : Drug Design

(2019 Pattern) (Semester - IV)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answer to the two sections should be written in separate answer books.***
3) ***Figures to the right indicate full marks.***

SECTION - I

Q1) a) Define the following. **[8]**

i) Full agonist ii) Pharmacophore

iii) Receptor iv) Inverse agonist

b) Explain the structure of cell membrane with well labelled diagram. **[3]**

Q2) a) Answer any one of the following. **[6]**

i) Give a comment on case studies of Artemisinin and related antimalarial drugs.

ii) Discuss the steps involved in signal transduction mechanism involved in GPCR.

b) Explain any two of the following. **[6]**

i) COMSIA

ii) Equation of best fit.

iii) Pharmacophore identitication

Q3) a) Answer any one of the following. **[6]**

i) Discuss the various drug receptor interactions theories.

ii) Discuss the basic features of pro drugs. Explain how does it helpful in improving absorption and lowering toxicity.

b) Answer any two of the following. **[6]**

i) Free - Wilson approach

ii) Hansch equation

iii) Role of secondary messenger in GPCR.

P.T.O.

SECTION - II

Q4) a) Define the following. **[8]**

i) Combinatorial chemistry ii) Genomics

iii) Linker iv) Proteomics

b) Define the term 'Energy minimisation, explain how this technique is central in many drug design techniques. **[3]**

Q5) a) Answer any one of the following. **[6]**

i) What is DNA Microarrays? How DNA microarrays could be used to diagnose a disease? Explain in detail.

ii) What is parallel synthesis? Explain.

1) Automated parallel synthesis.

2) Haughton's teabag procedure.

b) Discuss any two of the following. **[6]**

i) Antisense technology

ii) Monoclonal antibodies

iii) Virtual screening

Q6) a) Answer any one of the following. **[6]**

i) Explain any two methods used in search of conformational analysis.

ii) Discuss the following recombinant DNA products.

1) Tissue plasminogen activator.

2) Enzymes

3) Hormones

b) Write a short note on. (any two) **[6]**

i) Craig plot

ii) Human gene therapy

iii) High through put screening

Total No. of Questions : 6]

SEAT No. : ____

PC3817

[Total No. of Pages : 8

[6338]-403
M.Sc. - II
DRUG CHEMISTRY
CHD-462 (A) : Advanced Synthetic Methods in Chemistry
(2019 Pattern) (Semester - IV)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right side indicate full marks.***
3) ***Answers to the two sections should be written in separate answer books.***

SECTION - I

Q1) a) Explain the following. **[8]**

i) Pyrrolidine enamine of 2-Methyl cyclohexanone on reaction with methyl iodide gives 2,6-dimethyl cyclohexanone as the major product.

ii) Methoxymethyl (MOM) protection is preferred over methyl protection for hydroxyl group.

iii) 1,2 - Dicarbonyl compounds can be synthesized using umpolung strategy.

iv) Tetrahydropyranyl (THP) protection is stable under alkline candition but it can be cleaved in acidic condition.

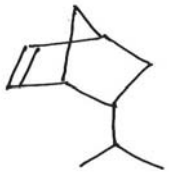
b) Explain the use of reagents in organic synthesis. **[3]**

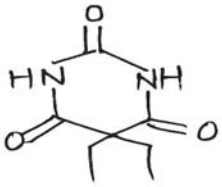
i) H_2/pd-C, $CaCO_3$

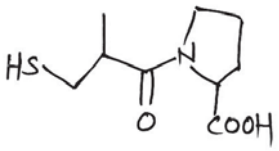
ii) O_3, PPh_3

P.T.O.

Q2) a) Using retrosynthetic analysis suggest a suitable method to synthesize the following (any two): **[6]**

i) 

ii) 

iii) 

b) Answer the following questions (any two) **[6]**

i) Give the difference between convergent and divergent synthesis.

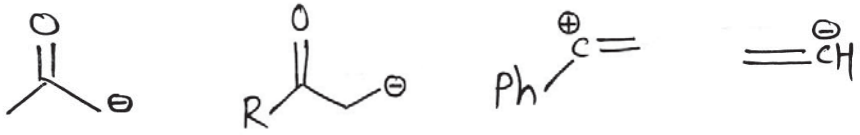
ii) Give two methods for synthesis of 1,4-dicarbonly compounds.

iii) Explain the role of protection in organic synthesis.

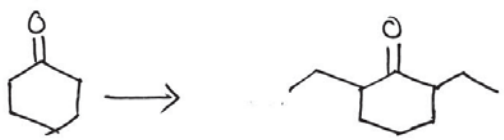
Q3) a) Answer any two of the following. **[6]**

i) Give one reaction with a reagent for each synthon given below.

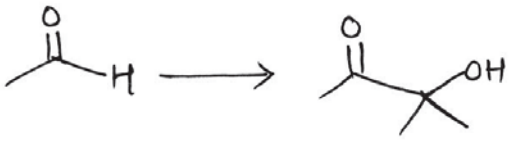
1) 2) 3) 4)



ii) Carry out the following transformation by enamine approach.

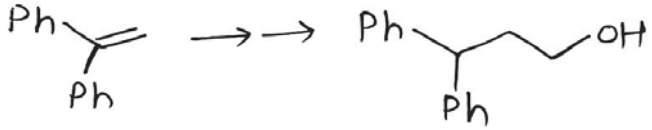


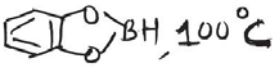
iii) Synthesize the following compound by using umpolung method.

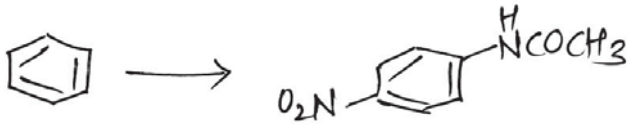


b) Arrange the reagents in proper order and write structures of the intermediate (any two) **[6]**

i)



ii) $NaOH/H_2O_2$, TBAF/THF; Me_3SiCHN_2; 



HNO_3, H_2SO_4; H_3CCOCl, $AlCl_3$; $SOCl_2$, Δ; NH_2OH

SECTION - II

Q4) a) Explain the following. **[8]**

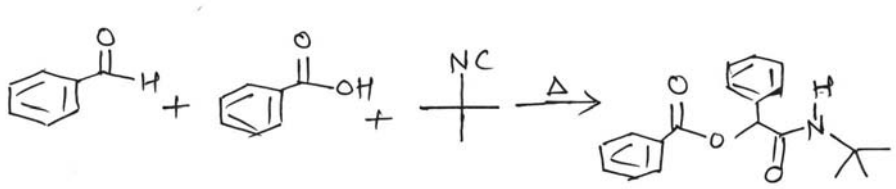
i) Diisopino camphenyl borane show higher enantioselectivity for cis alkene.

ii) Enlist the component of Beginelli reaction.

iii) Reactions of organolithiums are carried out in an atmosphere of dry nitrogen or argon.

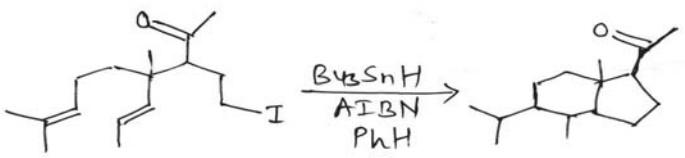
iv) How will you prepare dryl alkynes from aryl halide?

b) Write the mechanism for the formation of product given below. **[3]**

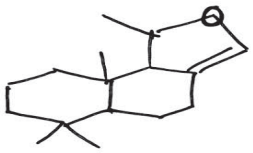


Q5) a) Answer any two of the following : **[6]**

i) What is Domino reaction? Explain the steps involved in the following reaction.

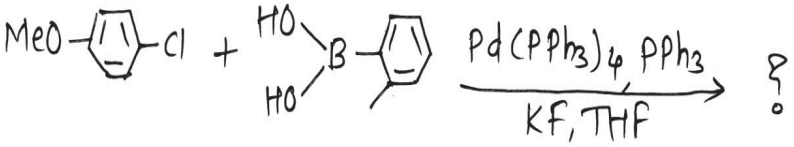


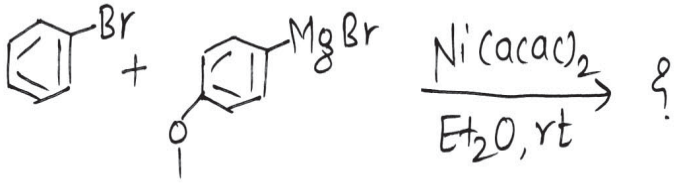
ii) Explain how biomimetic approach is used to obtain following compound.

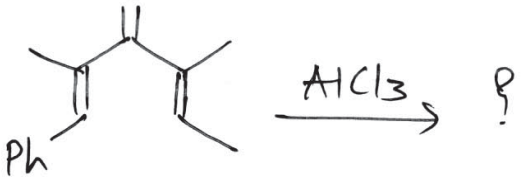


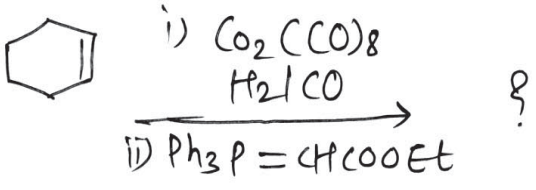
iii) Write notes on click chemistry.

b) Predict the product in any three of the following. **[6]**

i) 

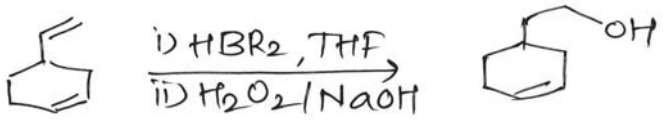
ii) 

iii) 

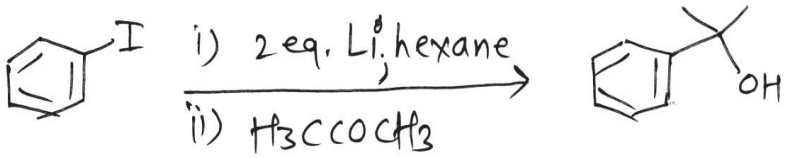
iv) 

Q6) a) Suggest the mechanism of any two of the following. **[6]**

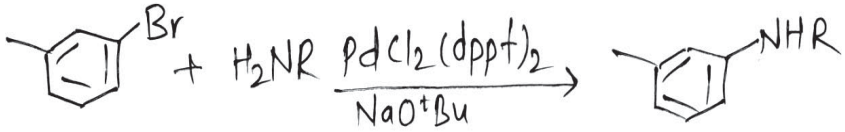
i)



ii)



iii)



b) Write short notes on (any two) **[6]**

i) Noyori dsymmetric hydrogenation.

ii) Heck reaction

iii) Bergmann cyclization

* * *

Total No. of Questions : 8]

PC3817

[6338]-403
M.Sc.-II
DRUG CHEMISTRY
CHD-462 (B) : Supramolecular Green Chemistry & Forensic Chemistry
(2019 Pattern) (Semester - IV)

Time : 3 Hours] ***[Max. Marks : 70***

Instructions to the candidates:

1) ***All question are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Answers to the two sections should be written in separate answer books.***

SECTION - I

Q1) a) Answer the following. **[6]**

i) Explain the green synthesis of catechol.

ii) Discuss the role of green chemistry in sustainable development.

b) Write short notes on. **[5]**

i) Solid phase organic synthesis

ii) Molecular devices.

Q2) Answer any four of the following : **[12]**

a) Explain the principles of green chemistry with suitable examples.

b) Explain the concept design principle of Molecular receptor.

c) Explain the agueous phase syn and anti hydroxylation.

d) Discuss dinuclear and polynuclear metal ion cryptates.

e) Explain catalysis by reactive macrocyclic cation receptor molecules with suitable example.

Q3) Answer any four of the following. **[12]**

a) Explain-supramolecular reactivity.

b) Explain-Molecular relcognition.

c) Discuss green chemical pathway for aziridine synthesis. What are the benefits achieved.

e) Explain in brief molecular channel and transport processes.

f) Explain the role of green chemistry in day to day lite.

SECTION - II

Q4) a) Answer the following. **[6]**

i) What are the steps involved in forensic drag analysis?

ii) What are the different pathways of the drug metabolism. Discuss their significance in forensic analysis.

b) Write short notes on. **[5]**

i) Classification of Narcotic drugs.

ii) Solvent abuse

Q5) Answer any four of the following. **[12]**

a) Discuss the principle for isolation and determination of amphetamine and methamphetamine from urine sample.

b) What are the different pathways of drug metabolism? Discuss their importance in drug analysis.

c) Explain invisible finger mark development using powder and fuming methods.

d) Discuss the spot tests used in analysis of opioid analgesics.

e) Discuss Drug and solvent abuse in brief.

Q6) Answer any four of the following. **[12]**

a) Write short notes on.

i) Poroscopy

ii) Edgeoscopy

b) Discuss following classes of drugs. Explain problems associated with their use.

i) Narcotics

ii) Stimulants

c) Explain the importance of footprints in forensic analysis. Explain how footprints can be preserved.

d) Explain urine analysis with suitable example for forensic investigation.

e) Discuss in brief chieloscopy.

❋ ❋ ❋

Total No. of Questions : 6]

SEAT No. :

PC4169

[Total No. of Pages : 2

[6338]-3001
M.Sc. -II
DRUG CHEMISTRY
CHD-601 MJ : Drug Discovery and Development
(2023 Credit Pattern) (Revised) (Semester-III)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answer to the two sections shoud be written in separate answer book.***
3) ***Figures to the right indicate full marks.***
4) ***Draw the neat label diagram wherever necessary.***

SECTION - I

Q1) a) Answer the following. **[8]**

i) Explain the toxins and venoms acts as a source of a drug.

ii) Define

1) Drug
2) Pharmacophore

iii) Write a short note on drug target.

iv) Explain lead compound.

b) Make a comment on Ayurveda system of medicine. **[3]**

Q2) a) Answer any one of the following. **[6]**

i) Explain the different types of dosage forms used in the formulation of drug.

ii) What is Lead? Discuss the different strategies used in Lead discovery.

b) How can we screened Lead compounds from the followings with examples. (any two) **[6]**

i) Natural products

ii) Plants

iii) Natural ligands

Q3) a) Answer any one of the following. **[6]**

i) Explain the following system of medicine

1) Allopathy
2) Homoeopathy

ii) Define pharmacokinetics. How are drugs metabolized in human body? Discuss the reactions of phase - I and phase - II metabolism.

b) Write a short note on (any two) **[6]**

i) Carbohydrates as a drug target.

ii) Nucleic acid as a drug target.

iii) FDA

P.T.O.

SECTION - II

Q4) a) Define the following. **[8]**

i) Placebo

ii) Therapeutic index

iii) Pharmacodynamics

iv) Pharmacokinetics

b) Make a comment on semisolid dosage forms. **[3]**

Q5) a) Answer any one of the following: **[6]**

i) Explain all the phases involved in clinical trials

ii) What is patent? Give it's basic and formal requirement of patents.

b) Discuss the following. (any two) **[6]**

i) Scale up process

ii) Drug distribution

iii) GMP

Q6) a) Answer any one of the following. **[6]**

i) Explain different routes of drug administration with examples.

ii) Give a brief account of the function performed by the following in a pharma industry.

1) R and D

2) GLP

3) Documentation

b) Write a short note on. (any one) **[6]**

i) Clinical trials - phase III and IV

ii) Phase - I metabolism

iii) Filling a patent application

■■■■

Total No. of Questions : 6]

SEAT No. :

PC4170

[Total No. of Pages : 6

[6338]-3002

M.Sc. - II

DRUG CHEMISTRY

CHD - 602 MJ : Spectroscopic Methods in Structure Determination

(Revised 2023 Credit Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Answer to the two sections should be written in separate answer books.***

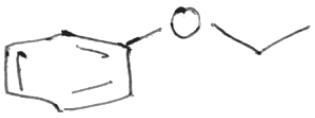
SECTION - I

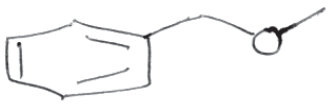
Q1) a) Answer the following. (any four) **[8]**

i) Methylcyclopentane shows base peak at m/e –56. Explain.

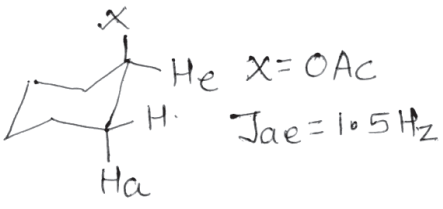
ii) In CMR spectroscopy peaks are not integrated. Explain.

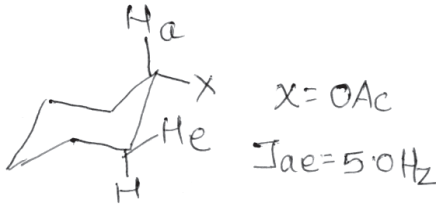
iii) Distinguish following compounds by PMR spectroscopy





iv) Explain the observed coupling constant values in the following compounds.

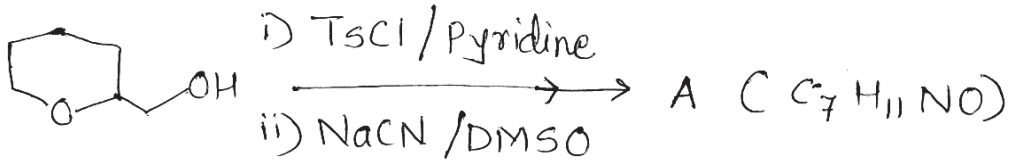




v) Deduce the structure of a compound with molecular formula $C_3H_5Cl_3$ which shows 10 (q), 51 (t), 102 (s) in its CMR spectrum.

P.T.O.

b) Identify the structure of the product 'A' obtained in the following reaction using given spectral data. **[3]**



IR-2238 cm^{-1}

CMR-22.8 (t), 24.9 (t), 25.2 (t), 31.0 (t),
68.7 (t), 72.8 (d), 117.3 (s)

PMR- 1.4-1.8 (m, 6H), 2.49 (d, J=6Hz, 2H),
3.45 (dt, J=11. 0 & 3.0 Hz, 1H), 3.55 (m, 1H) 4.0 (m,1H)

Q2) Deduce the structure. (any four) **[12]**

a) M.F:- $C_7H_{12}O$
PMR:- 1.08 (s,6H), 2.21 (d,7Hz, 2H), 5.08 (d, 11.8Hz, 1H),
5.11 (d, 15.5 Hz, 1H), 5.75 (ddt, 11.8, 15.5 & 7.2 Hz, 1H),
9.49 (s, 1H)
CMR- 21 (q), 41.0 (t), 45(s), 118 (t), 133 (d), 206 (d)

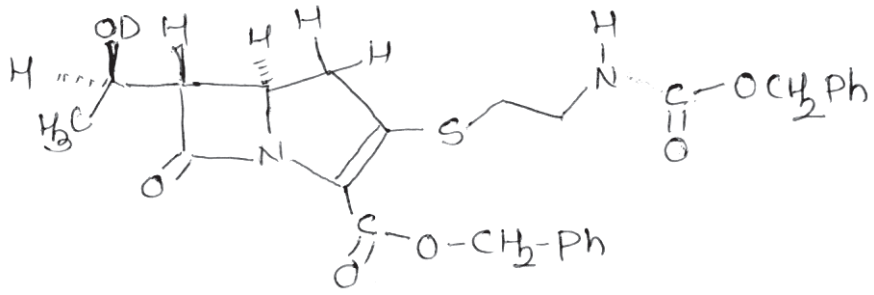
b) M.F:- $C_5H_{10}O_2$
PMR:- 4.1 (4H,s), 1.5(6H,s)
CMR:- 25(q, strong), 68 (t), 95 (s)

c) MF:- $C_9H_{10}O_3$
IR:- 3400, 1680 cm^{-1}
PMR:- 7.8 (1H, d,J=8Hz), 7.0 (1H, d,J=8Hz),
6.5 (1H, s), 5.8(1H, bs, exch.) 3.9 (3H,s) 2.3 (3H,s)

d) MF: $C_8H_{10}O_2$
CMR: 55(q), 64 (t), 114 (d, strong), 133.5(s)
129 (d, strong), 159 (s)
PMR:- 2.0 (s, exch., 1H), 3.8 (s,3H), 5.0(s, 2H),
6.5 (d, J=7Hz, 2H), 6.8 (d, J=7Hz, 2H)
Mass:- 138, 137, 107

e) MF:- $C_6H_8O_2$
CMR:- 17.1, 21.1, 68.8, 120.3, 165.6, 190.4
DEPT 90:- 165.6, 190.4 -up, All other are absent
DEPT. 135:- 165.6, 190.4-up
17.1,21.1, 68.8 down.

Q3) a) Assign the signals to the different protons in following compound. Comment on the observed chemical shifts and coupling constants. **[6]**



1.28(3H, d, 6.5Hz), 2.95(2H,m), 3.08(dd. 1H, 9&18Hz)
3.15(1H,dd, 2.5&7Hz) 3.35(1H, dd, 9&18Hz),
3.37(2H,m), 4.13 (1H, da, 7 & 6.5Hz),
4.19(1H,dt,2.5 & 9Hz), 5.08(s,2H),
5.23 and 5.31 (2H, AB system), 5.80 (1H,bs)
7.34 (10 H,m)

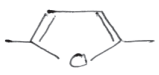
b) Write short notes. (any two) **[6]**

i) Nuclear overhauser Effect
ii) ABC spin system
iii) FAB and MALDI Techniques.

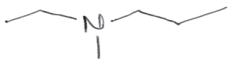
SECTION - II

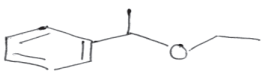
Q4) a) Write the genesis of Fragment ions. (any four) **[8]**

i) 2-Nitroaniline - 138, 121, 92, 80, 65

ii)  96, 95, 81, 53, 43

iii)  148, 120, 106, 105, 77, 51

iv)  101, 100, 86, 72

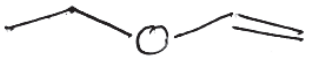
v)  150, 135, 107, 77

b) An aromatic compound $C_{11}H_{14}O$ shows following peaks in its mass spectrum. Deduce its structure. m/e:- 162, 134, 119, 91, 77, 71, 43. **[3]**

Q5) a) Answer the following. (any two) **[6]**

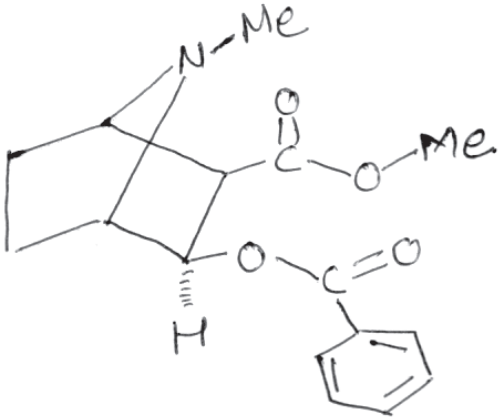
i) A compound $C_{10}H_8$ exhibits two doublets at 7.8 and 7.5 ppm in its PMR spectrum. It exhibits 133.7 (s), 128 (d), 126.6 (d) in CMR. Deduce the structure.

ii) Benzylacetate shows base peak at M-42 in its Mass spectrum. Explain

iii) Draw the PMR spectra of 

Indicate approximate chemical shift values and coupling constants giving the splitting pattern.

b) i) Assign the signal to the carbon atoms in the following molecule. Explain your answer. **[4]**



25.8 (t), 35.9 (t), 41.4 (q), 50.8(d),

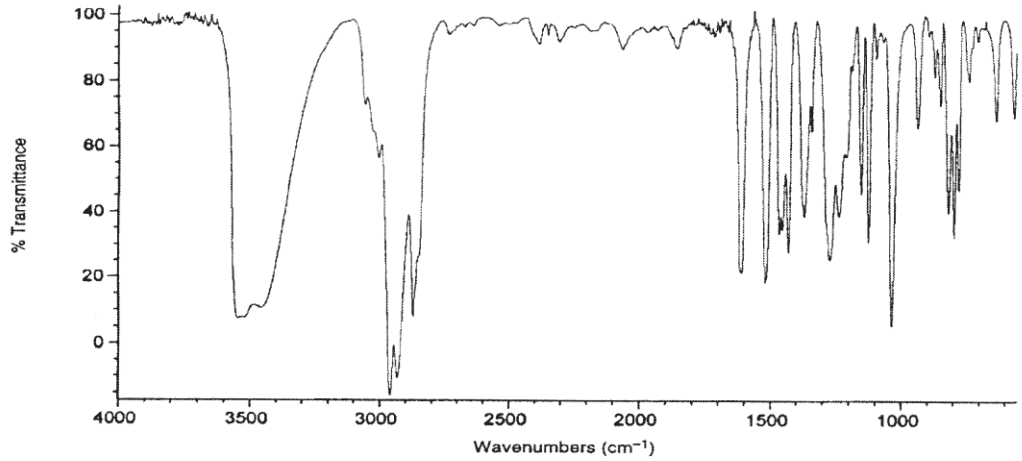
51.5 (q), 62.1 (d), 65.4(d), 67.5 (d),

129.1 (d), 130.5 (s), 131. 0(d), 130.0(d),

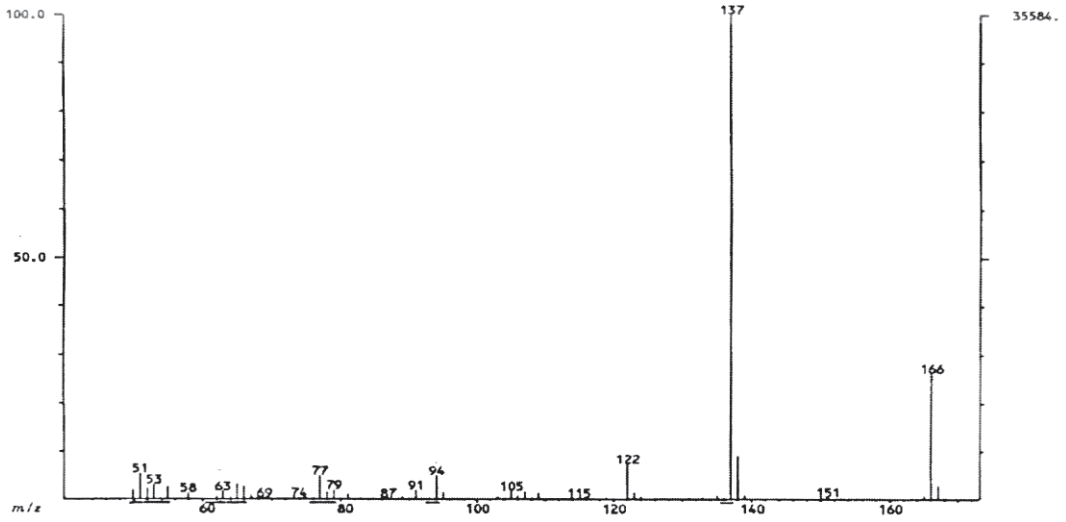
167.1 (s), 171. 6 (s).

ii) Sensitivity of ^{13}C signal is about 6000 times less intense than ^{1}H signal in NMR. Explain. **[2]**

Q6) A compound exhibits following spectral properties show non attached sheet. Suggest the structure for the compound and explain the observed spectral data. **[12]**


100
80
60
40
20
0
% Transmittance
4000
3500
3000
2500
2000
1500
1000
Wavenumbers (cm⁻¹)

MASS


100.0
50.0
m/z
137
35584.
166
122
51
53
58
63
69
74
77
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87
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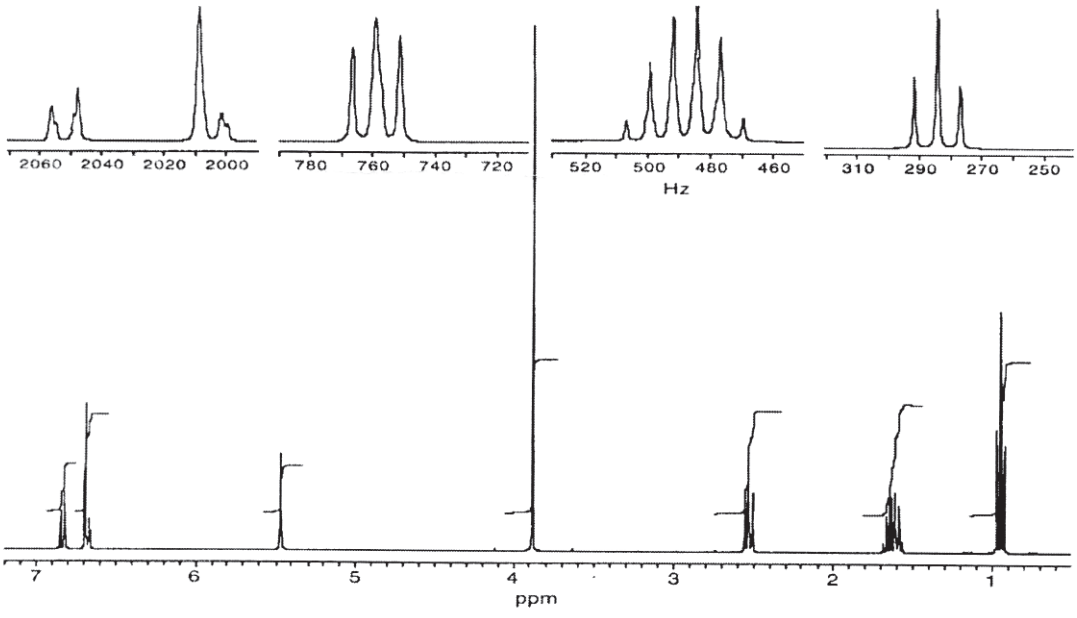
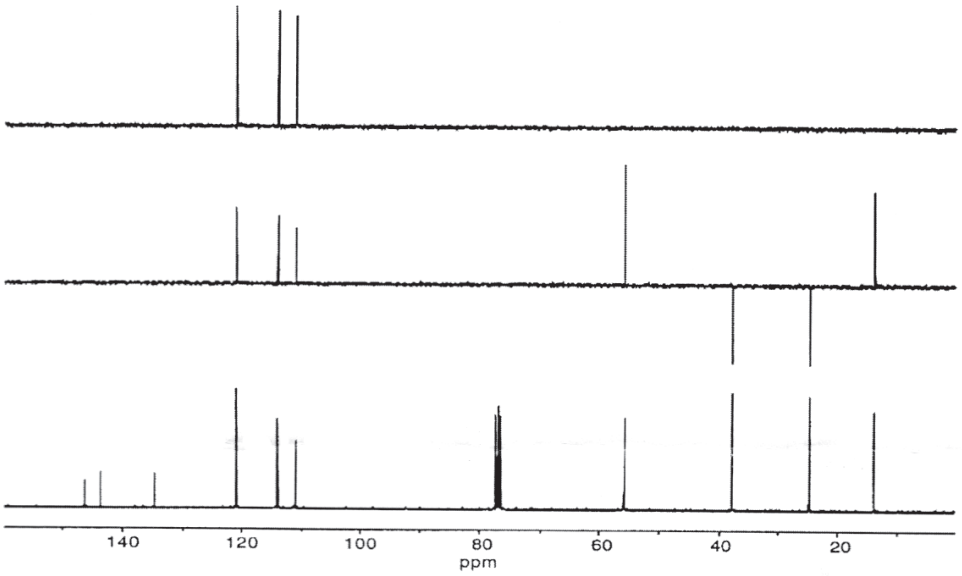
151
60
80
100
120
140
160

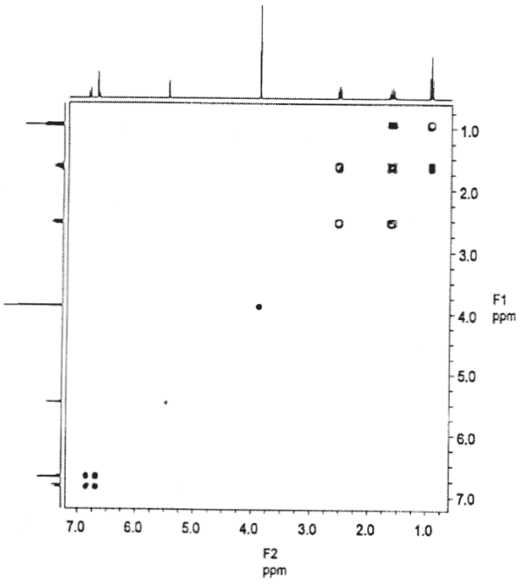
^{1}H NMR


2060
2040
2020
2000
780
760
740
720
520
500
480
460
Hz
310
290
270
250
7
6
5
4
3
2
1
ppm

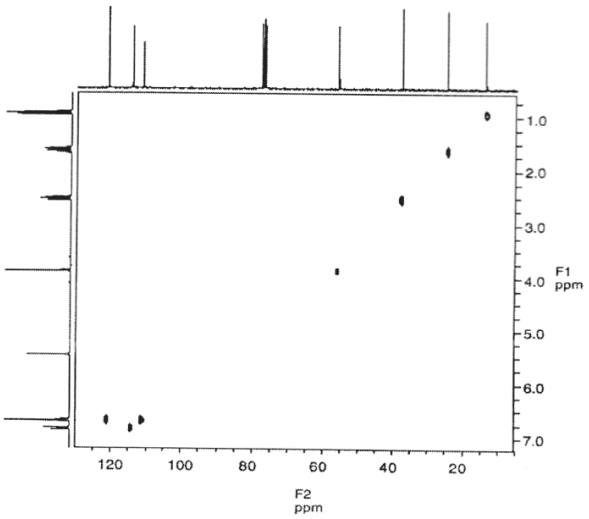
^{13}C/DEPT



COSY



HETCOR



Total No. of Questions : 3]

SEAT No. :

PC4171

[Total No. of Pages : 3

[6338]-3003

M.Sc. - II

DRUG CHEMISTRY

CHD-603 MJ : Stereochemistry

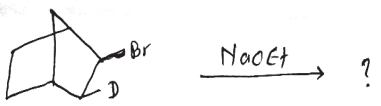
(Revised 2023 Credit Pattern) (Semester-III) (2 Credits)

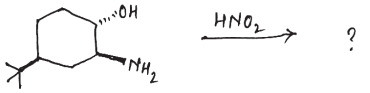
Time : 2 Hours] *[Max. Marks : 35*

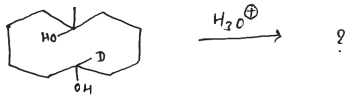
Instructions to the candidates:

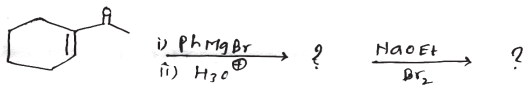
1) ***All questions are compulsory.***
2) ***Figures to the right indicate full marks.***
3) ***Draw the neat label diagram wherever necessary.***

Q1) a) predict the product of the following and explain the stereochemical principles involved. **[8]**

i) 

ii) 

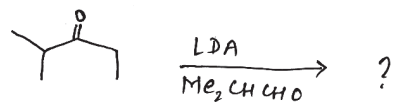
iii) 

iv) 

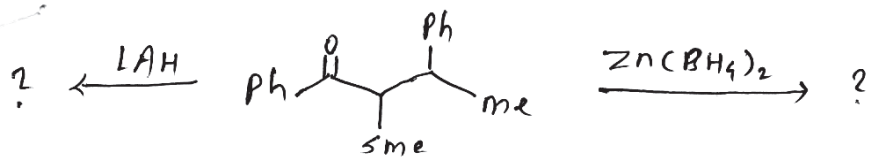
b) Draw trans-syn-trans and cis-anti-trans perhydroanthracene. Compare their stability and comment on their optical activity. **[3]**

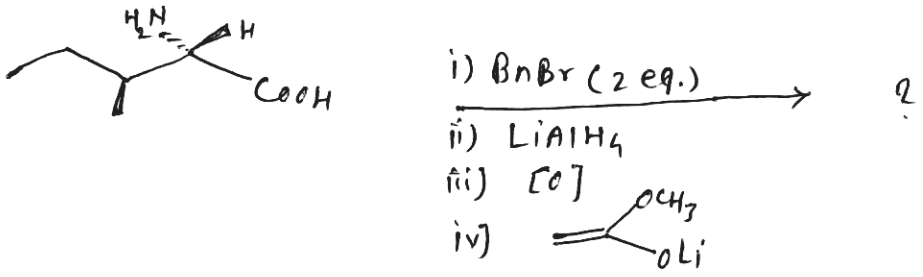
P.T.O.

Q2) a) Complete the following conversions and suggest the correct stereochemistry of the products. (any three) **[6]**

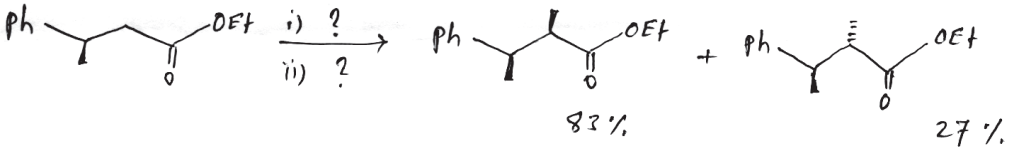
i) 

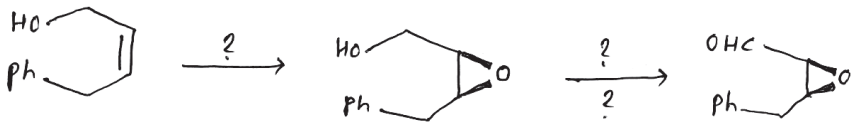
ii) 

iii) 

iv) 

b) Suggest the reagent and write mechanism of the following reactions. (any two) [6]

i) 

ii) 

iii) 

Q3) Answer any four of the following. **[12]**

a) Write a short note on Saquinavir.

b) Explain:

i) 2 - Alkyl Ketone effect.

ii) 3 - Alkyl Ketone effect.

c) Write a note on Limitations of Bred's rule.

d) Explain - concept of Chiral auxillary.

e) Describe - Sharpless Asymmetric epoxidation.

Total No. of Questions : 9]

SEAT No. :

PC4172

[Total No. of Pages : 7

[6338]-3004

M.Sc. - II

DRUG CHEMISTRY

CHD-610MJ(Sec-I to Sec-III) (Any two)

Section-I-CHD-610 (A)MJ: Advanced Heterocyclic Chemistry

Section-II-CHD-610 (B)MJ : Synthesis of Biologically Active Molecules

Section-III-CHD-610 (C)MJ : Microbiology and Immunology

(Revised 2023 Credit Pattern) (Semester-III)

Time : 3 Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt any two of I, II and III Sections.***
2) ***All questions are compulsory.***
3) ***Answer to the two sections should be written in separate answer books.***
4) ***Figure to the right indicate full marks.***

SECTION - I

(CHD - 610 (A)MJ - Advanced Heterocyclic Chemistry)

Q1) a) Explain the following. **[8]**

i) Pyrimidine is resistant to the electrophilic substitution than benzofuran.

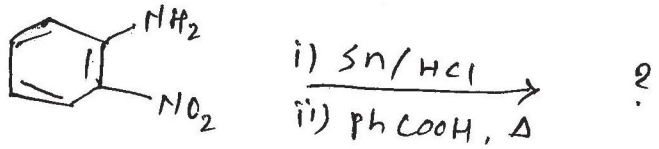
ii) Imidazole has high boiling point than 1.3-oxazole.

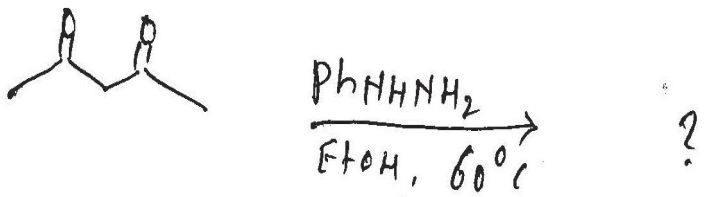
iii) Benzofuran is substituted almost exclusively at 2-position but indole at 3-position.

iv) Coumarin is easily attacked by electrophilic as well as nucleophilic reagents.

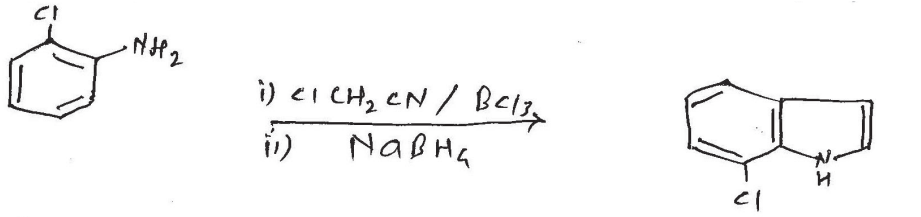
P.T.O.

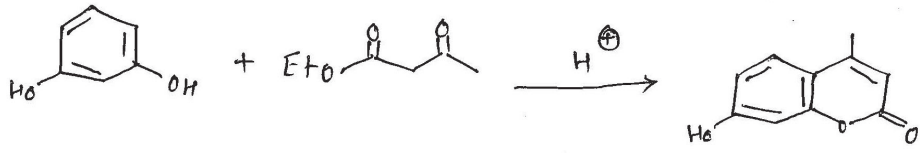
b) Predict the product in the following. **[3]**

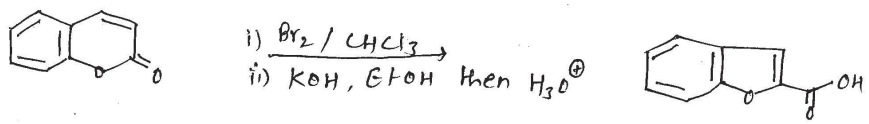
i) 

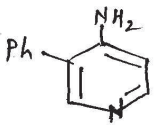
ii) 

Q2) A) Suggest the suitable mechanism for any one of the following. **[6]**

a) i) 

ii) 

b) i) 

ii) $PhCH_2CN + HCONH_2 \xrightarrow[180^oC]{NH_3}$ 

B) Write a short note on any two of the following. **[6]**

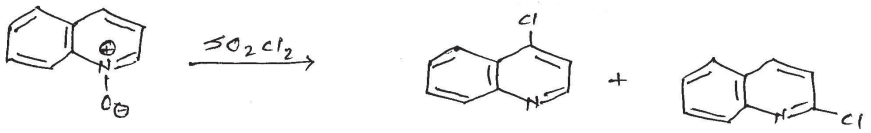
a) Pechmann-Coumarin synthesis

b) Fischer-Indole synthesis

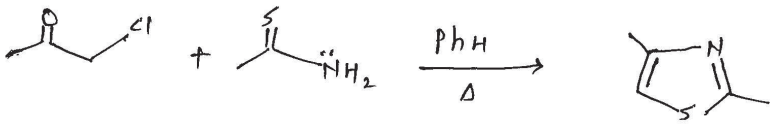
c) Skraup Quinoline synthesis

Q3) A) Suggest the mechanism for any one of the following. **[6]**

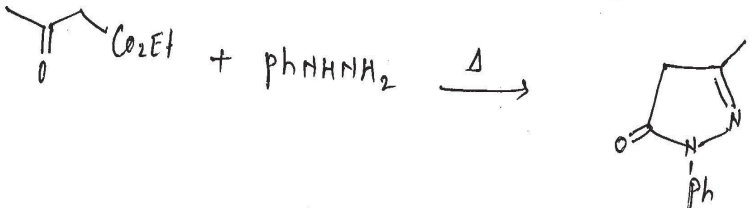
a) i)



ii)



b) i)



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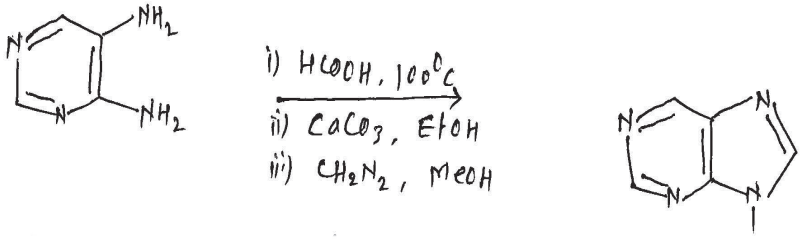
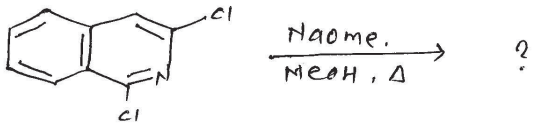


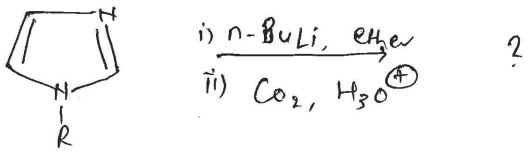
B) Answer any two of the following. **[6]**

a) Pyridine is weaker base than imidazole. Explain.

b) Write a short note on Gabriel synthesis.

c) Predict the product in the following.



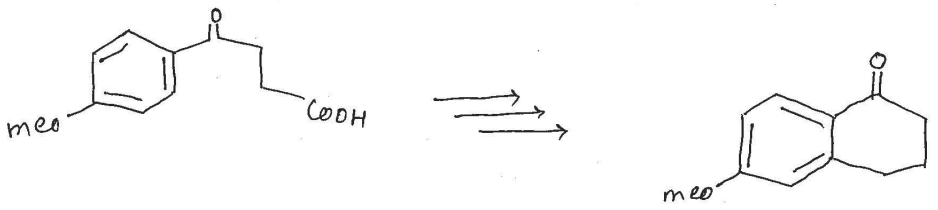


SECTION-II

(CHD-610(B) MJ: Synthesis of Biologically Active Molecules)

Q4) a) Describe the steps involved in the synthesis of following drug molecules. Explain the mechanism involved. **[8]**

i)



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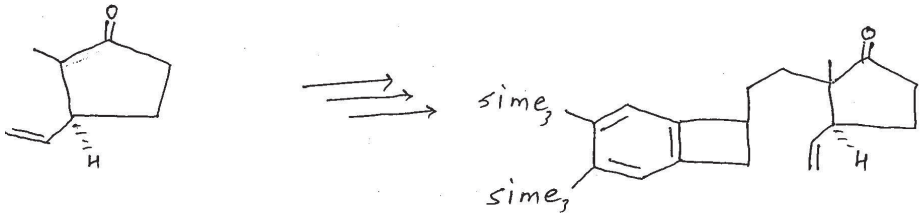

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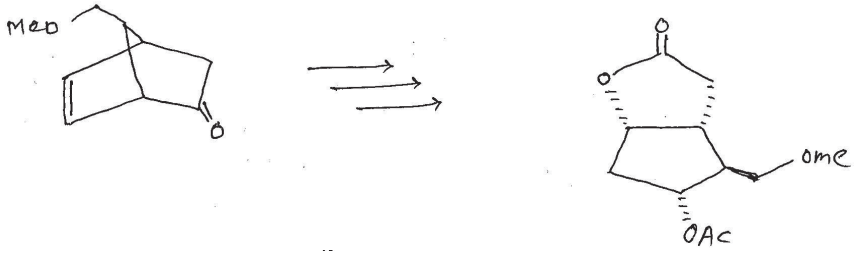

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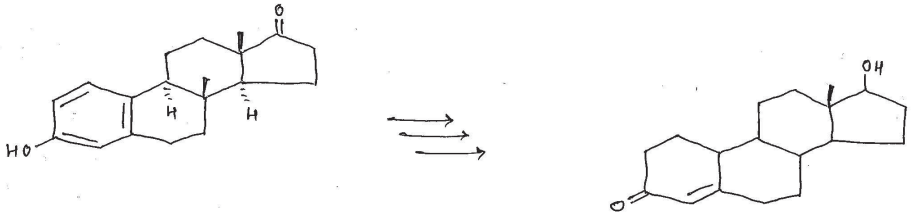
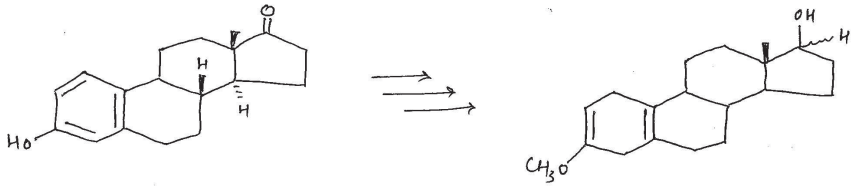


b) Insert the missing reagents/products in the following sequences of reactions. Explain the steps with mechanism. **[3]**

i)



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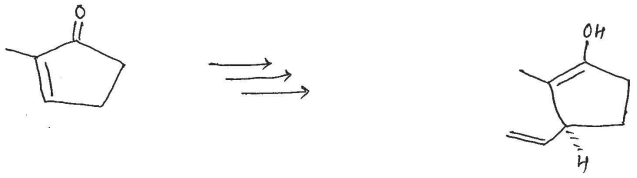
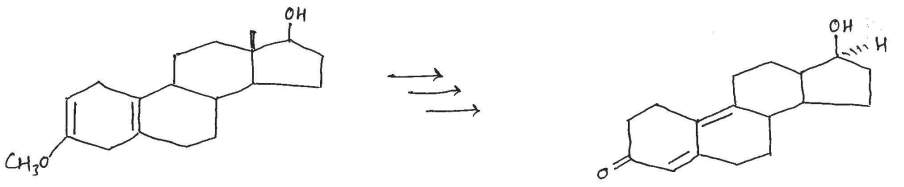


Q5) A) Discuss the steps involved in the synthesis of the following molecules. Explain the stereochemistry and mechanism involved in all steps. (any one) **[6]**

a) i)



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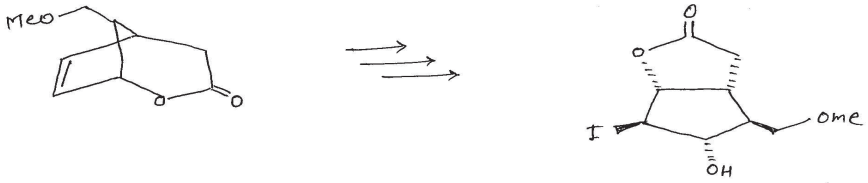
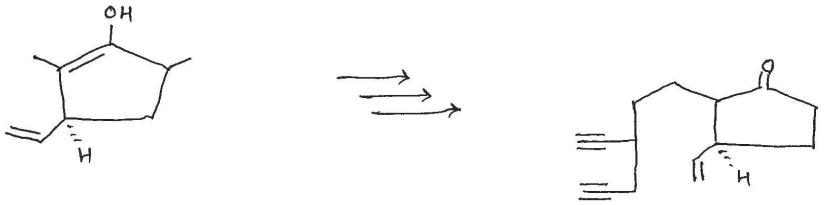


b) i)



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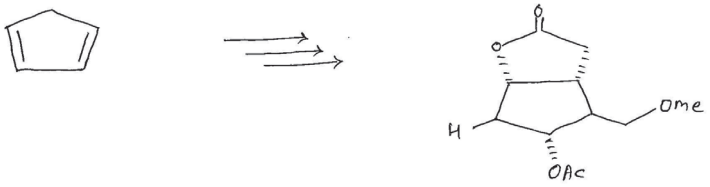
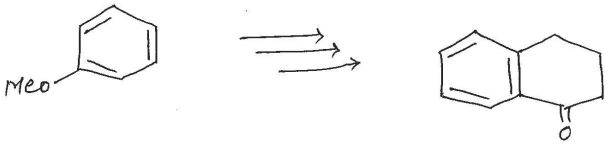


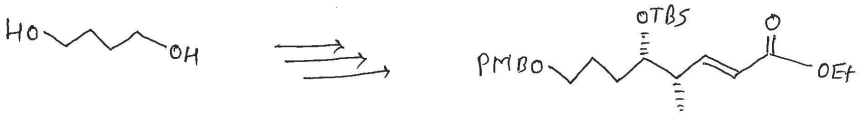
B) Discuss the steps involved in the synthesis of the following. Explain the stereochemistry and mechanism involved. (any two) **[6]**

a)



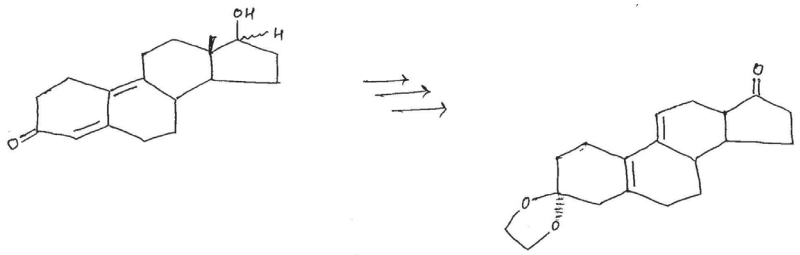
b)

c)



Q6) A) Describe the steps involved in the synthesis of following drug molecules. Explain the mechanism involved. (any one). **[6]**

a) i)



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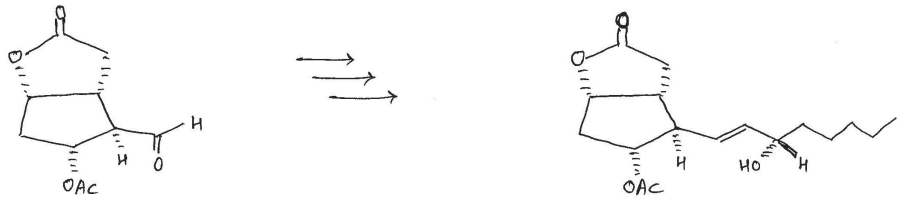
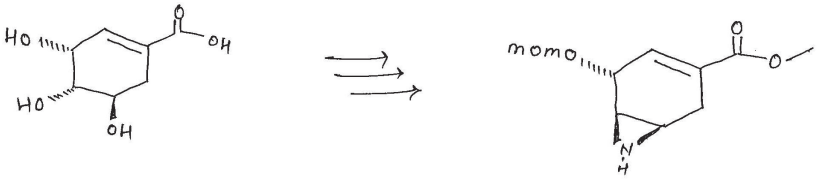


b) i)



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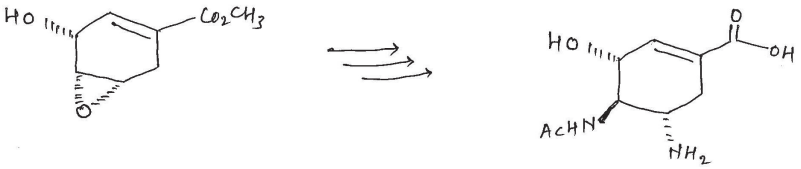

B) Write a short note on. (any two) **[6]**

a) Merits and Demerits of convergent synthesis.

b) Mc-Murray pinacol coupling with example.

c) Regio-selectivity and stereo selectivity.

SECTION - III

(CHD - 610 (C) MJ- Microbiology and Immunology)

Q7) a) Answer the following : **[6]**

i) Explain the morphological characters of bacteria.

ii) What are the methods used for isolation of micro-organism. Describe any one in detail.

b) Attempt the following : **[5]**

i) Explain the role of cytokines in immune response.

ii) T and B lymphocytes.

Q8) Answer any three of the following : **[12]**

a) Discuss in brief bacterial strain improvement.

b) What is antimicrobial assay? How it is performed?

c) Comment on any two methods of strain improvement of bacterium used in fermentation.

d) Explain the following terms :

i) Phagocytosis

ii) Passive immunity

Q9) Answer any four of the following : **[12]**

a) Explain ELISA technique.

b) What are monoclonal antibodies? Explain its production.

c) Discuss the need for treatment of an effluent from drug manufacturing industry.

d) Describe the different parts of industrial scale fermenter.

e) Describe primary and secondary immune response.