Total No. of Questions :6]

SEAT No. :

P1964

[Total No. of Pages : 5

[5325] - 301

M.Sc.

DRUG CHEMISTRY

CHD - 361 : Chemistry of Heterocycles and Drug Synthesis

(2013 Pattern) (Semester - III) (Credit System)

Time : 3 Hours] *[Max. Marks :50*

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 book.***

SECTION - I

Q1) Explain any four of the following. **[8]**

a) Pyrimidine undergoes electrophilic substitution mainly at C_5 - position. Explain.

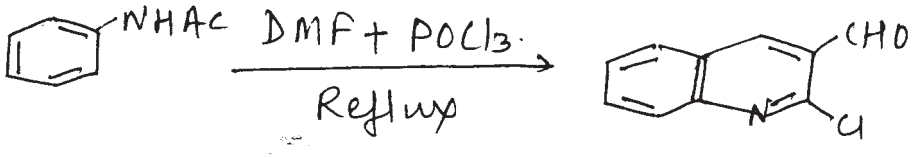
b) Pyrrole -2- carbaldehyde does not undergo benzoin condensation. Explain.

c) Imidazole is a stronger base than phyridine.

d) Acid catalyzed hydrolysis of furan produces. 1,4 - dicarbonyl compound.

e) Furan has lower B.P than pyrrole.

Q2) Suggest the suitable mechanism for any four of the following. **[8]**

a) 

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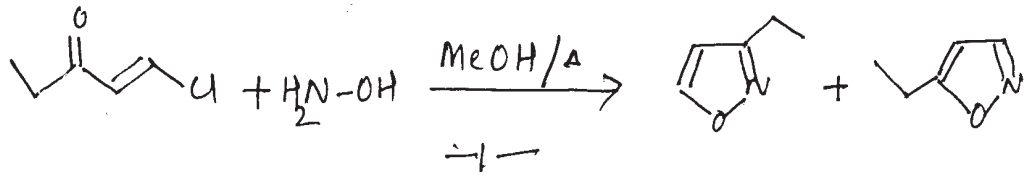
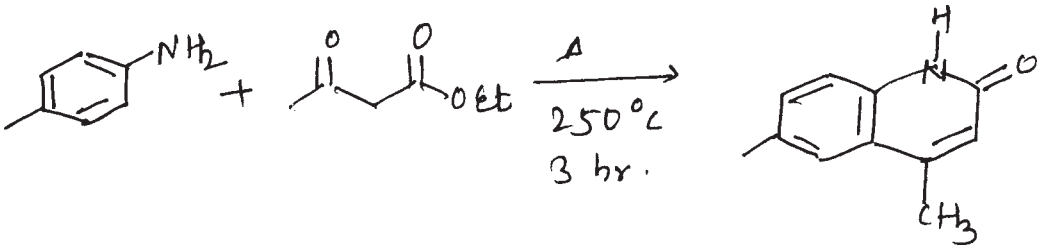
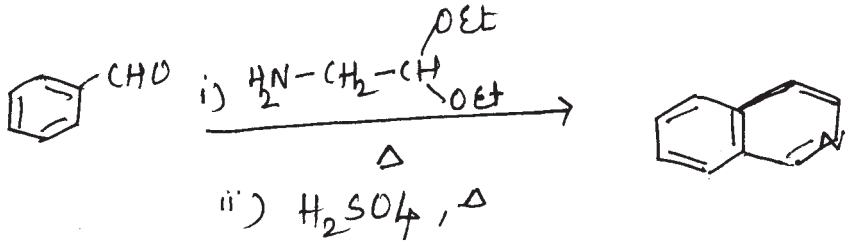
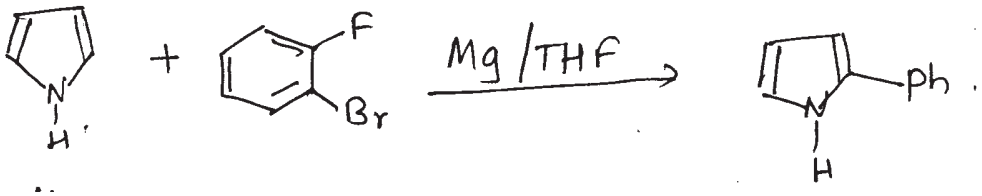
b) 

c) 

d) 

e) 

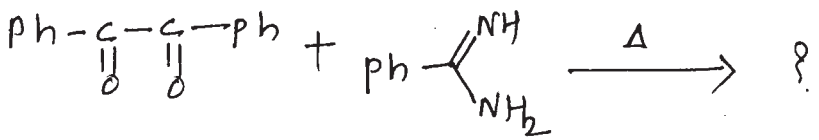
Q3) a) Write short notes on any two of the following. **[4]**

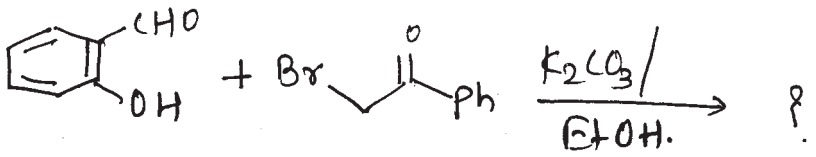
i) Synthesis of benzofuran.

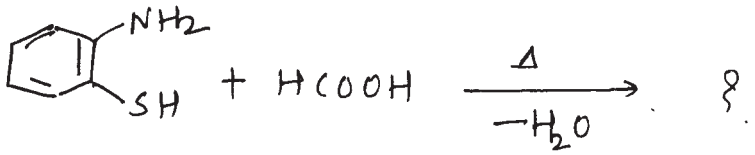
ii) Pechmann synthesis.

iii) Fischer Indole synthesis.

b) Predict the product for any two of the following. **[5]**

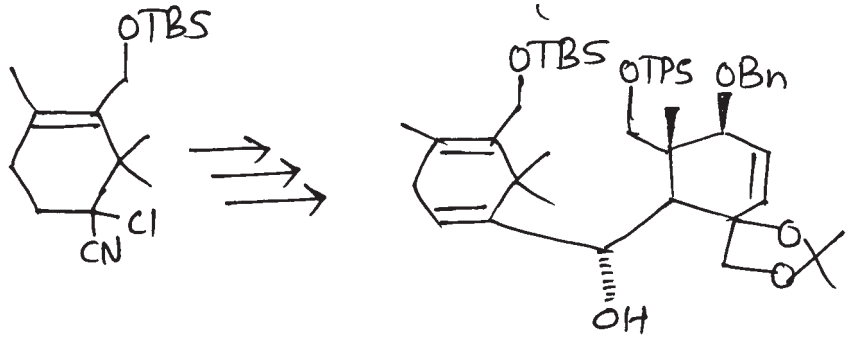
i) 

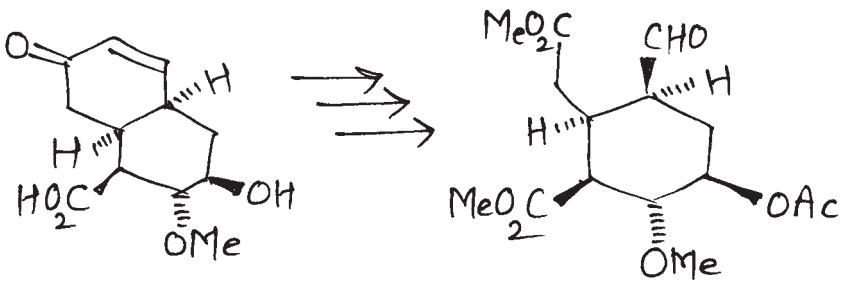
ii) 

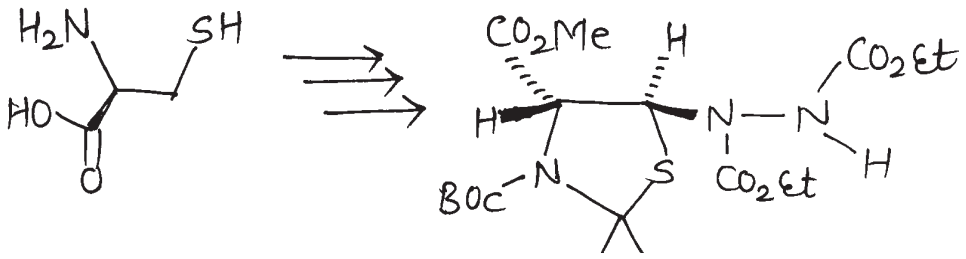
iii) 

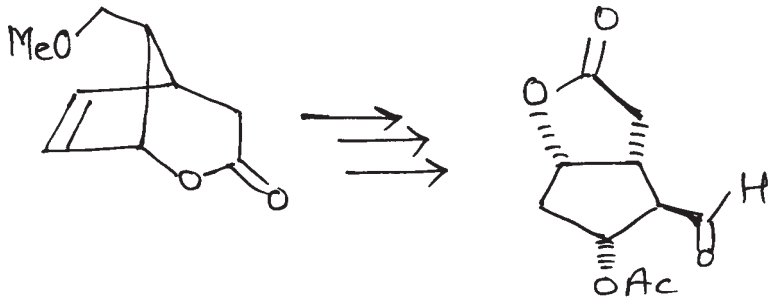
SECTION - II

Q4) Discuss the steps involved in the synthesis of following molecules. Explain the stereochemistry and mechanism involved (any three). **[9]**

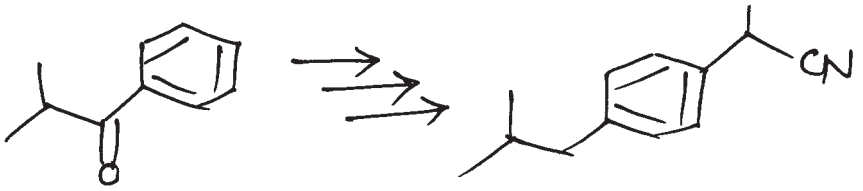
a) 

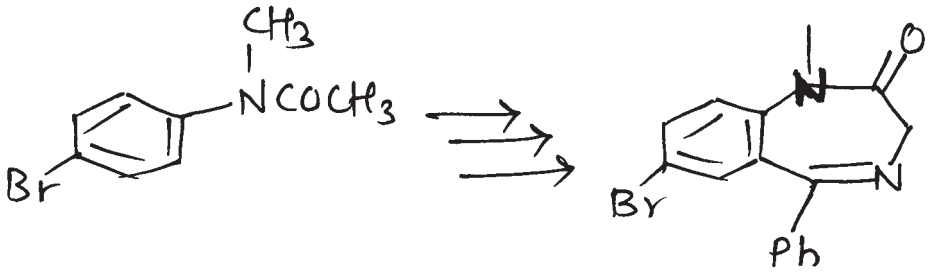
b) 

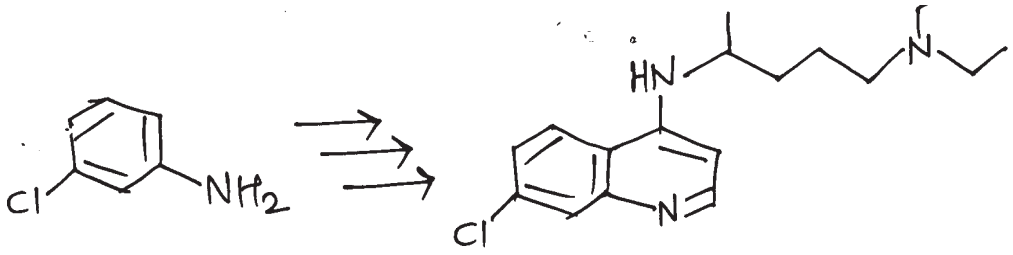
c) 

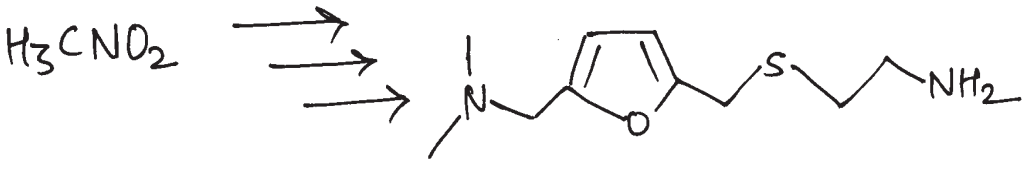
d) 

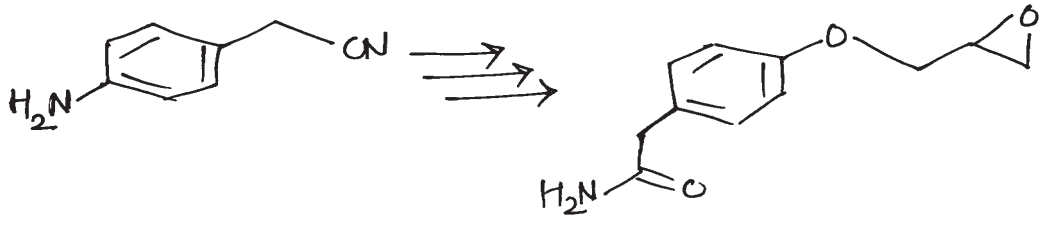
Q5) Discuss the steps involved in the synthesis of following drug molecules from the precursor shown (any four). **[10]**

a) 

b) 

c) 

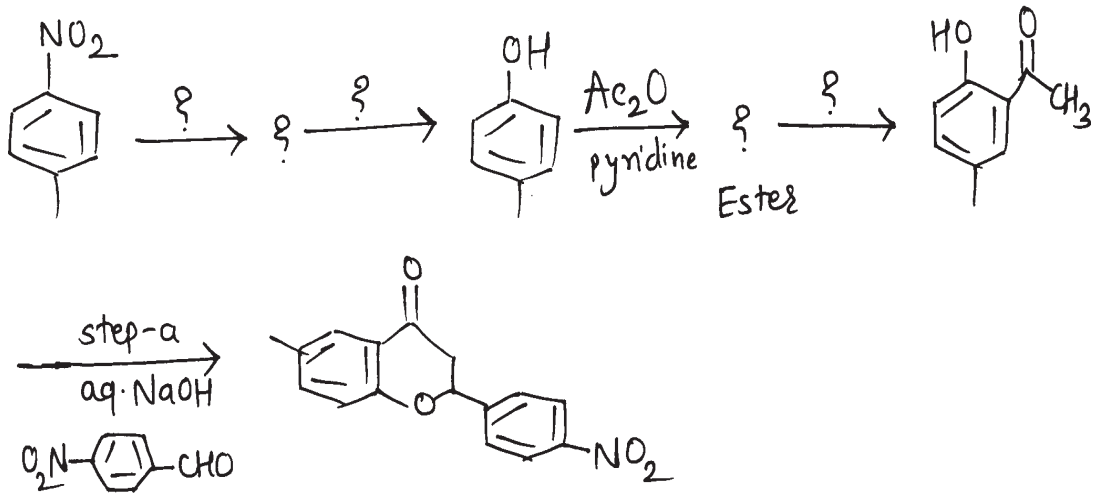
d) 

e) 

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

a) Boron template methodology for Diels- Alder reaction in taxol synthesis.

b) Put the missing reagents/intermediates in the following synthesis. Explain mechanism for step - a



c) Explain any one of the following.

i) McMurray - pinacol coupling

ii) Horner Wadsworth Emmons reaction.

Total No. of Questions : 6]

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M.Sc.

DRUG CHEMISTRY

CHD-362: Advanced Analytical Methods

(2013 Pattern) (Semester - III)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

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

SECTION-I

Q1) a) Answer the following (any three): **[6]**

i) Methyl hydrogens in acetonitrile are more shielded than those in methyl chloride even though the electronegativity of cyano group is greater than that of chlorine atom. Explain.

ii) For equal number of nuclei, CMR peaks are much weaker than PMR peaks. Explain.

iii) Explain the chemical shift observed in the following compounds.

1) $\underline{C}Cl_4$ $\underline{C}I_4$ 96.7

2)  X = NH 18.2

= S 18.7

= O 39.7

iv) CI MS could be used in case of compounds with low or no M^+ in MS.

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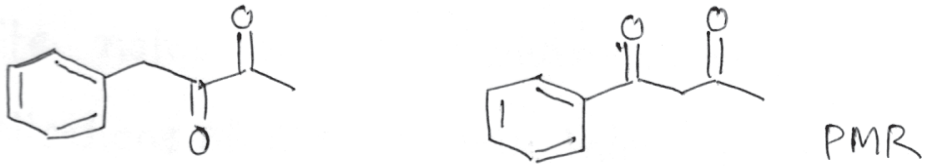
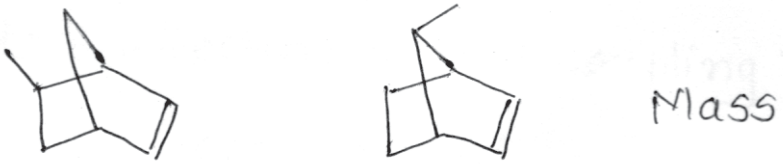
b) Distinguish between the following pairs using the indicated spectral methods (any two): **[3]**

i) 

ii) 

iii) 

Q2) Using the given spectral information, deduce the structures of the following (any four): **[10]**

a) MF : $C_{11}H_{10}O_4$

PMR: 3.96 (S, 12 mm), 6.08(S, 8 mm), 6.48 (d, J = 8Hz 4 mm), 6.68(d, J = 8Hz, 4 mm), 6.70 (dd, J = 16 & 8Hz, 4 mm), 7.38 (d, J = 16Hz, 4 mm), 9.73 (d, J = 8Hz, 4 mm).

b) MF : $C_8H_{10}O_2$

CMR: 159 (s,w), 133.5 (s,w), 129 (d, str.), 114 (d, str.), 64(t, mod), 55 (q, mod).

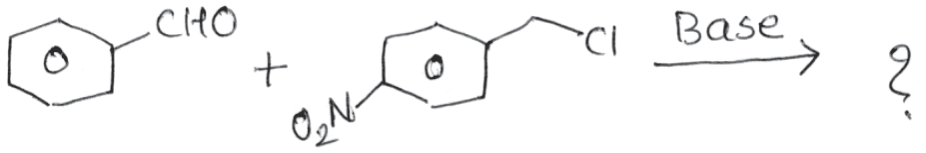
c) Mass: 172 (M^+), 174 (M+2) Both of equal intensity.

IR : 3500 cm^{-1}

PMR: 5.2 (s, 1H), 6.8 (d, J = 8Hz, 2H), 7.3 (d, J = 8Hz, 2H)

CMR: 155, 135, 118, 116

d) Predict the product for the following reaction whose spectral data is given below.



Mass: 241 (M^+, 60%), 90 (100%), 89 (62%)

PMR: 3.89 (d, J = 3Hz, 1H), 4.01 (d, J = 3 Hz, 1H), 7.31(s, 5H), 7.54 (d, J = 10Hz, 2H),

8.29 (d, J = 10Hz, 2H).

CMR: 148, 144, 136, 130, 127, 126, 125, 122, 64, 62

Q3) Write notes on the following (any three): **[6]**

a) Application of cosy in NMR interpretation.

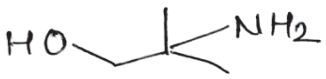
b) Ionization techniques in MS.

c) Factors affecting vicinal coupling in PMR.

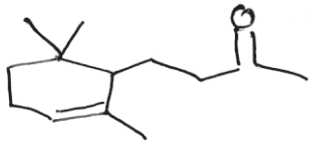
SECTION-II

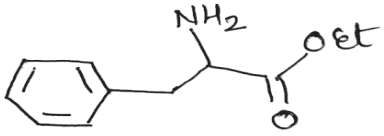
Q4) a) Write the genesis of the indicated ion for any three of the following: **[6]**

i) Methyl salicylate 120, 121, 152

ii) 

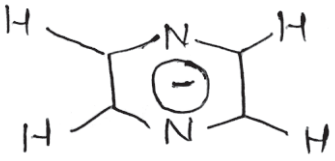
31, 58, 74

iii) 
121, 136, 192

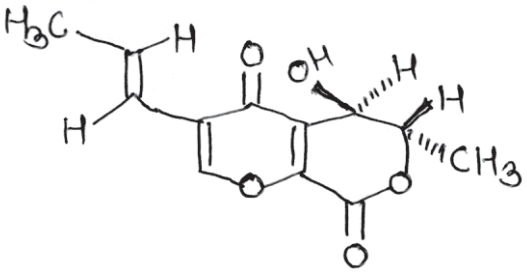
iv) 

91, 102, 120, 193

b) What is hyperfine splitting in ESR? How many lines are seen in the ESR spectrum of pyrazine anion? What will be the intensities of these lines? **[2]**



Q5) a) Assign the chemical shifts to various protons in the given structure. Comment on the observed coupling constants and double resonance experiment. **[5]**

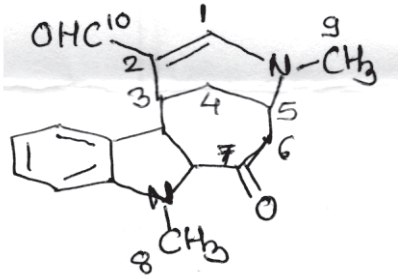


1.65 (d, J = 7Hz, 3H), 1.97 (dd, J = 6 & 1.5 Hz, 3H), 3.86 (bs, exch. 1H), 3.92 (d, J = 5 Hz, 1H), 4.32 (dq, J = 7 &5 Hz, 1H), 5.87 (d, J = 2Hz, 3H), 6.06 (ddq, J = 16, 2 & 1.5 Hz, 1H), 6.99 (dq, J = 16 & 6.0 Hz, 1H)

Spin decoupling Experiments:

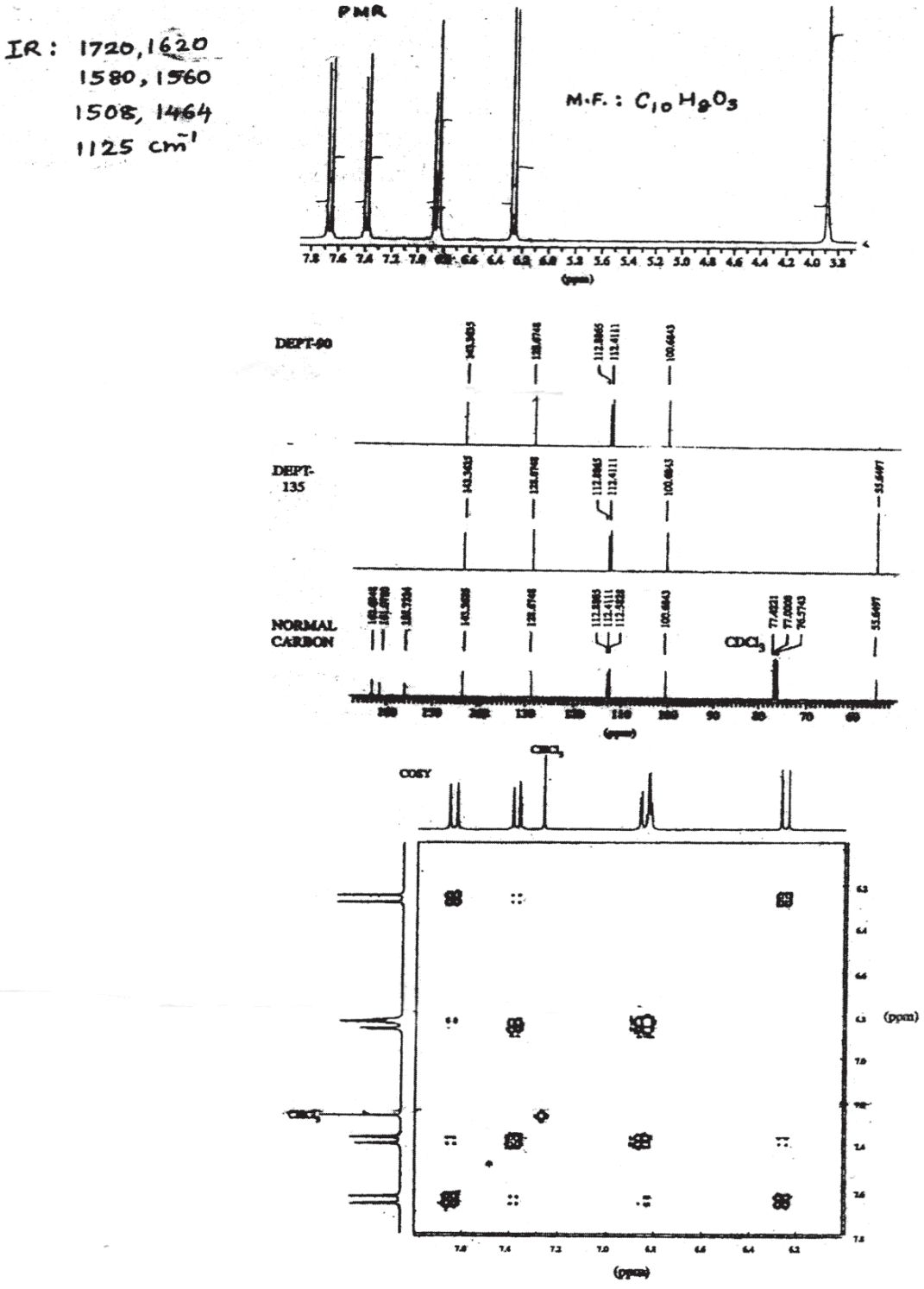
Irradiation at	Change at
δ 6.06	δ 5.87 d → s
	δ 6.99 dq → q, 6Hz
	δ 1.97 dd → d, 6Hz
δ 3.92	δ 4.32 dq → q, 7 Hz

b) Assign the signals to the numbered carbon atoms in the following structure and justify your answer. **[3]**



193.6 (s, w), 184.9 (d), 153.1 (d), 125.6 (s, w), 54.4 (d), 48 (t) 42.3 (q), 41.5 (q), 30.7 (d) 23.9(t).

Q6) a) Deduce the structure of the compound whose spectral informaiton is given on the next page. **[9]**



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SEAT No : ____

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M.Sc.

DRUG CHEMISTRY

CHD-363: Microbiology, Immunology & Drug Discovery and Development

(2013 Pattern) (Semester III) (Credit System)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

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

SECTION - I

Q1) Attempt any Three of the following : **[12]**

a) Short note on : Bacterial growth curve.

b) Describe the microbial effluent treatment.

c) Short note on : Any one method of antimicrobial assays.

d) State the parts of a typical fermentor. Add a note on use of each part.

e) Describe any one method of isolating micro-organisms.

Q2) Attempt any Three of the following : **[9]**

a) State the organs of Immune system and add a brief note on their functions.

b) Describe type I or type IV Hypersensitivity.

c) State the characteristics of Adaptive immunity and briefly describe structure of a typical antibody.

d) Describe any one method of precipitation used in antigen or antibody detection.

e) What is immunodefeciency. Add a note on its symptoms.

P.T.O.

Q3) Explain <u>any Four</u> of the following terms : **[4]**

a) Immunoglobin
b) Antibiotics
c) Pharmacokinetics
d) Pharmacodynamics
e) Drug target
f) Agonist.

SECTION-II

Q4) Answer <u>any three</u> of the following : **[12]**

a) Discuss in brief the parameter used in toxicological evaluation of New drugs.

b) Explain how the screening of Lead compounds has been carried out from the following sources-

i) Natural Ligand

ii) Existing drugs.

c) What is GMP ? Enlist the guidelines covered under the GMP.

d) Explain in brief the different Routes of drug administration with examples.

e) Give a brief commentary on the phases of clinical trials.

Q5) Answer <u>any two</u> of the following : **[8]**

a) Explain the following :

i) Novelty
ii) State of the art
iii) Priority date
iv) Invention

b) What is dosage Forms ? Explain in brief the types of dosage forms.

c) Discuss the following system of medicines.

i) Allopathy
ii) Homeopathy

Q6) Answer <u>any two</u> of the following : **[5]**

a) Strategies in process development.

b) Industrial hygene and safety.

c) Pharmacophore Identification

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Total No. of Questions : 6]

SEAT No. : ____

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M.Sc.

DRUG CHEMISTRY

CHD - 364 : Stereochemistry, Asymmetric Synthesis & Pericyclic Reactions

(2013 Pattern) (Semester - III)

Time : 3 Hours] ***[Max. Marks : 50***

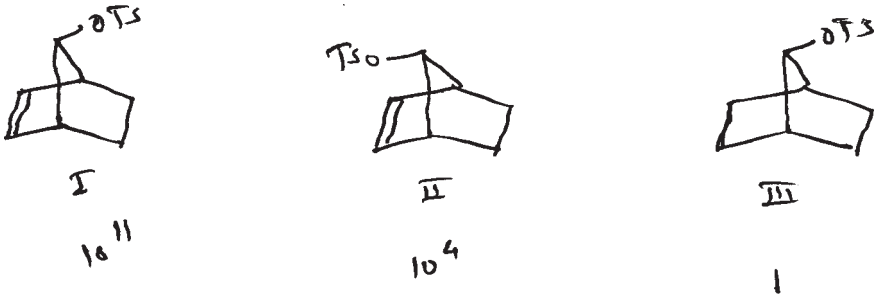
Instructions to the candidates:

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

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

a) Explain the relative rate of hydrolysis of following compounds.



b) Give the conformations of cyclopentane and explain their stability.

c) Explain the relative rates of Saponification reaction of 4-t-butyl cyclohexyl-p-nitrobenzoate and ethyl-t-butyl cycle hexane carboxylate.

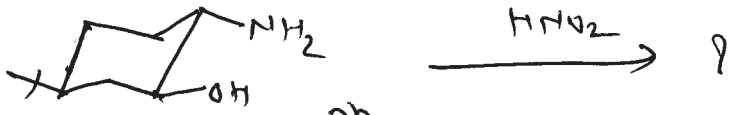
d) Chair-boot interconversion is more facile in cyclohexanone than in cyclohexane. Explain.

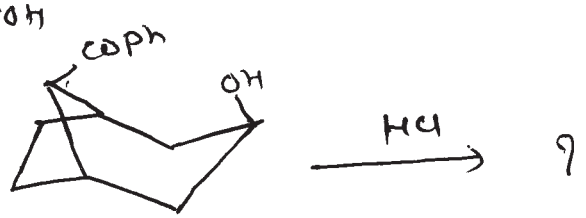
e) β-isomer of hexa chloro cyclohexane react very slowly than its other isomers. Explain.

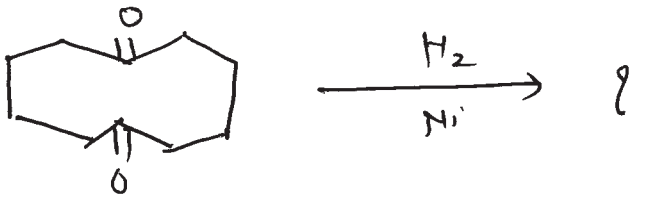
P.T.O.

Q2) Predict the product/s & explain the stereochemistry and mechanism (Any Four) : **[8]**

a) 

b) 

c) 

d) 

e) 

Q3) a) Write short note on (any two) : **[4]**

i) I-Strain.

ii) Syn elimination reaction.

iii) Cram's rule.

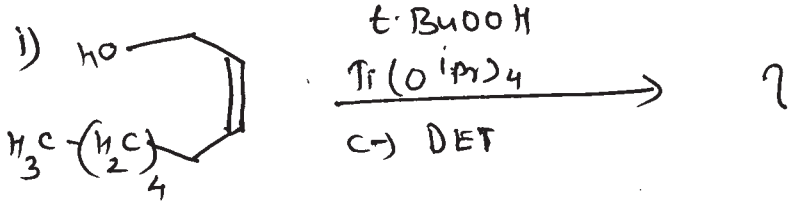
b) Answer the following : **[5]**

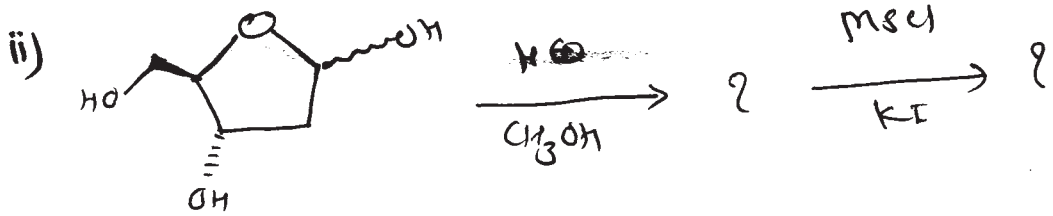
i) Calculate the percentage of major enantiomer if enantiomer excess (ee) is 95%.

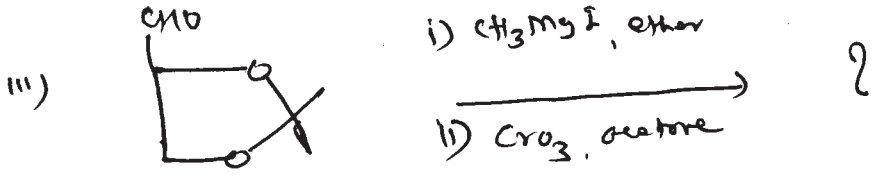
ii) Give short account of Chiral reducing reagents.

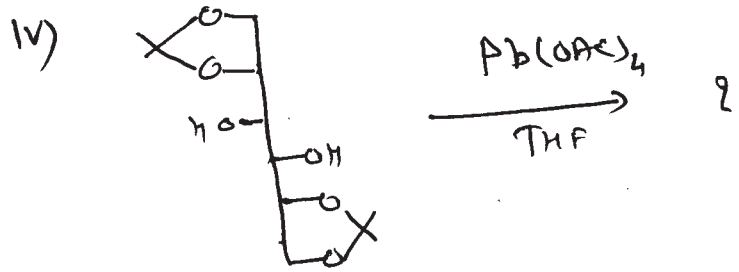
SECTION - II

Q4) a) Complete the following reactions (Any Three) : **[6]**

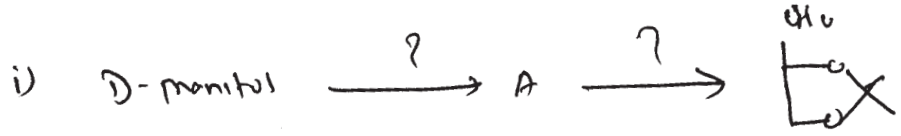
i) 

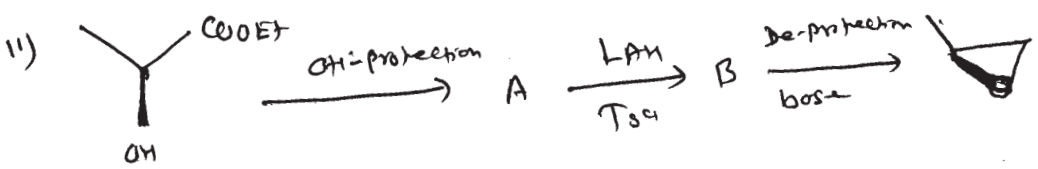
ii) 

iii) 

iv) 

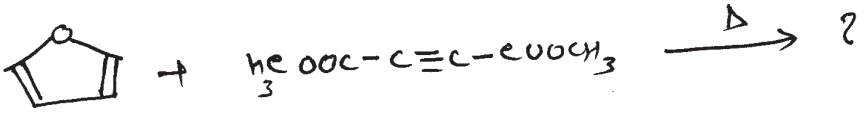
b) Explain the steps and write appropriate reagent to achieve the desire product. **[5]**

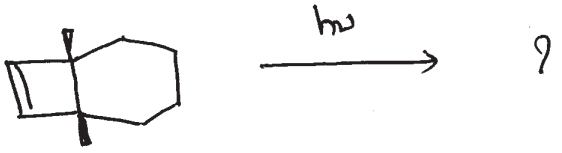
i) 

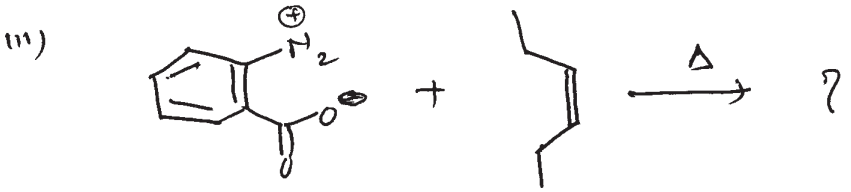
ii) 

Q5) a) Draw correlation diagram for cycloaddition reaction between 1, 3 - butadiene with ethylene. Check whether the process is thermally OR photochemically allowed. **[3]**

b) Predict the products (Any three) : **[6]**

i) 

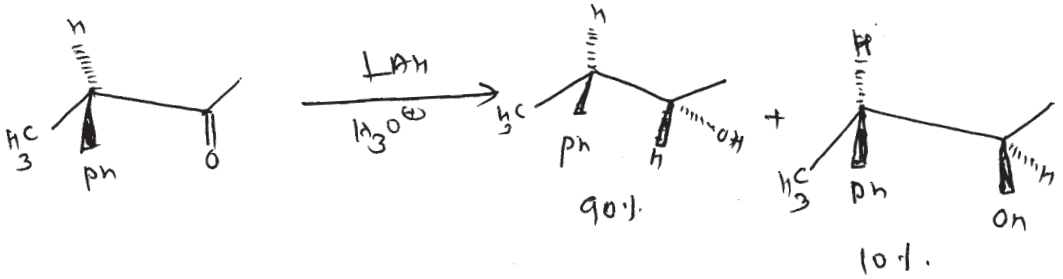
ii) 

iii) 

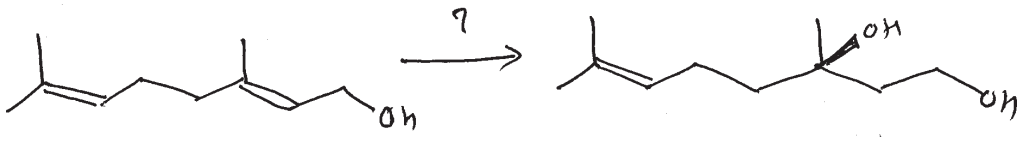
iv) 

Q6) Answer the following questions (Any two) : **[5]**

a) Using Flekin rule explain the following transformation.



b) Complete the following reaction.



c) Write short note on “Chiral Auxillary”.

Total No. of Questions : 6]

SEAT No. :

P1968

[Total No. of Pages : 4

[5325]-401

M.Sc.

DRUG CHEMISTRY

CHD - 461 : Advanced Organic Synthesis, Principles and Strategies

(2013 Pattern) (Semester - IV)

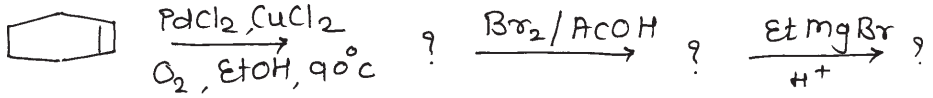
Time : 3 Hours] *[Max. Marks : 50*

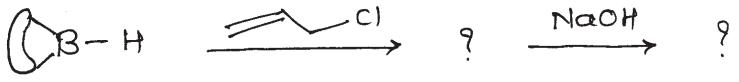
Instructions to the candidates:

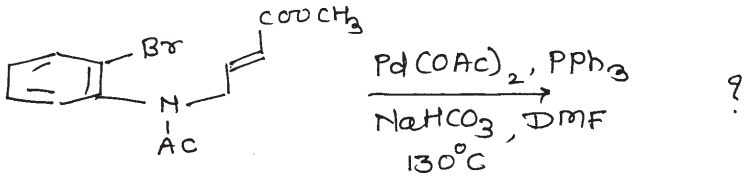
1) *All questions are compuslory.*
2) *Answers to the two sections should be written in seperate answer books.*
3) *Figures to the right indicate full marks.*

SECTION - I

Q1) a) Predict the products for the following transformations. (any two) **[6]**

i) 

ii) 

iii) 

b) Explain any two of the following: **[3]**

i) 2 substituted 1, 3 dimethoxy benzene derivatives can be synthesized from 1, 3 dimethoxy benzene using organolithium compound.

ii) 1, 4 dicarbonyl compounds can be prepared by reagents having umpolung reactivity.

iii) Di isopinocamphenyl borane shows higher enantio selectivity for cis - alkene.

P.T.O.

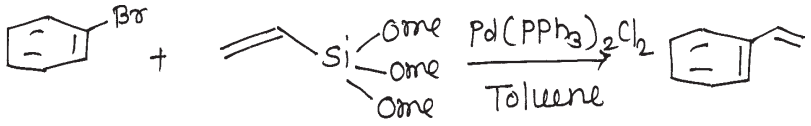
Q2) a) Carry out the following conversions justify your answer (any two). **[4]**

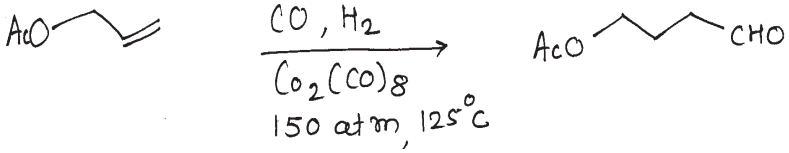
i) 

ii) 

iii) 

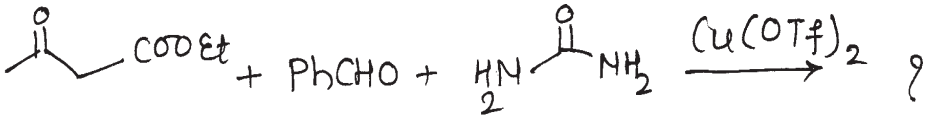
b) Suggest the mechanism for the formation of the product (any two). **[4]**

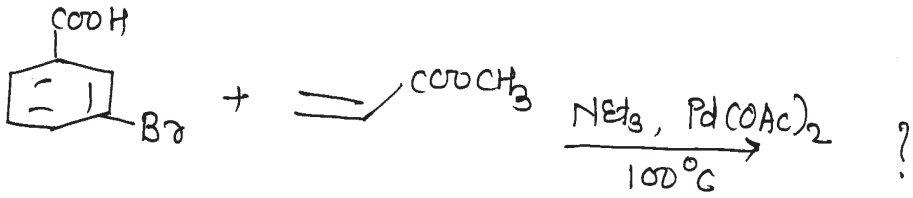
i) 

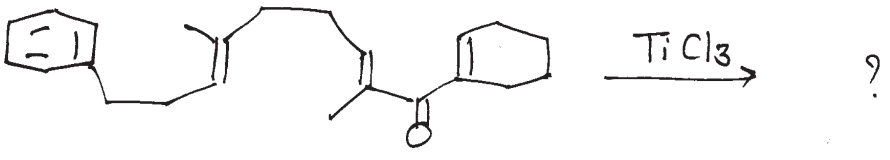
ii) 

iii) $Ar-X + H-C\equiv C-R \xrightarrow[\substack{Et_2NH\\ 25^\circ C, 3-6\,hrs}]{[pd]^0, CuI} Ar-C\equiv C-R$

Q3) a) Write the product with suitable mechanism. (any two) **[4]**

i) 

ii) 

iii) 

b) Write short notes on any two of the following: **[4]**

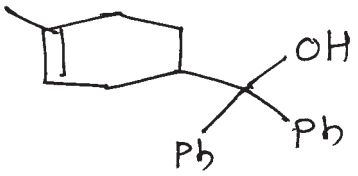
i) Fukuyama reaction.

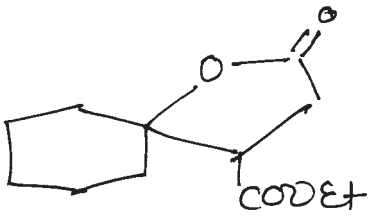
ii) Pausan - Khand reaction.

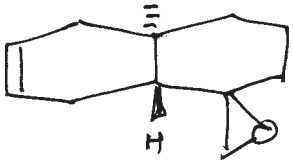
iii) Heck reaction.

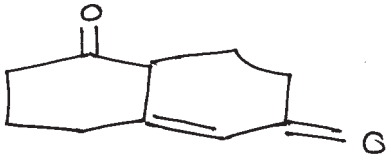
SECTION - II

Q4) Using retrosynthetic analysis suggest the suitable method to synthesize. any three of the following compounds. **[9]**

i) 

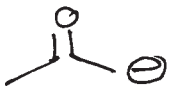
ii) 

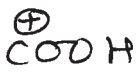
iii) 

iv) 

Q5) a) Answer any two of the following: **[4]**

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

1) 

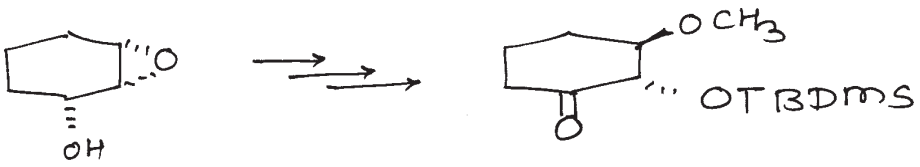
2) 

ii) Carry out the following transformation by enamine approach.

iii) Employing umpolung, carry out the following transformation.

b) Complete any two of the following transformations. **[4]**

i)



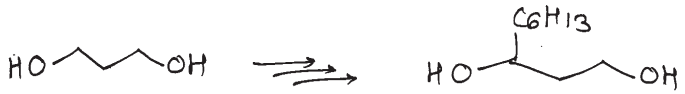
TBDMS–Cl, PY; PPC, NaOAC; NaH, BnBr, H_2/Pd–C

ii)

nBuLi, THF, -78°C ; LiBr, O ; H_3O^+, Δ ;

PPh_3, MeCN ; MsCl, Et_3N, CH_2Cl_2 ; Ph⁄⁄CHO, THF

iii)



PCC, NaOAc ; H_3O^+ ; DHP, H^+ ; $C_6H_{13}MgBr$; MeOH, H^+

Q6) a) Answer any two of the following: **[4]**

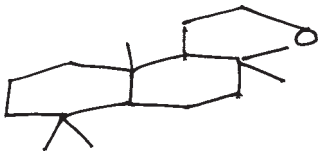
i) Benzyloxy carbonyl protection is preferred than benzyl group for protection of amino group of amino acid during peptide synthesis.

ii) Atom economy in Green Chemistry.

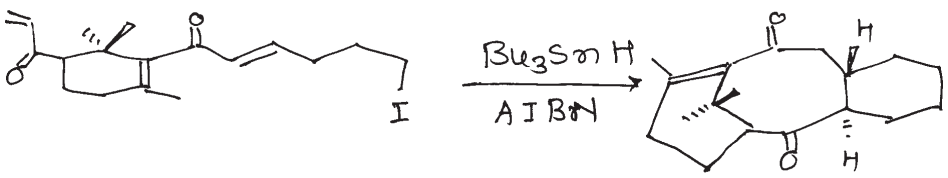
iii) Discuss role of ionic Liquids in Organic synthesis.

b) Define Biomimetic reaction, suggest **[2]**

i) Synthesis for the following molecule.



ii) What is Domino reaction. Explain the steps involved in the following reaction. **[2]**



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Total No. of Questions : 6]

SEAT No. :

P1969

[Total No. of Pages : 3

[5325] - 402

M.Sc.

DRUG CHEMISTRY

CHD - 462 - Advanced Medicinal Chemistry

(2013 Pattern) (Semester - IV)

Time : 3 Hours] *[Max. Marks : 50*

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 side indicate maximum marks.***

SECTION - I

Q1) Answer any three of the following. **[9]**

a) Discuss in brief the development of I, II & III generation penicillins. Explain the benefits achieved in each generation.

b) How does quinolone antibiotics exhibit their activity? Expalin the mode of action in detail.

c) Expalin the process of protein biosynthesis. Explain the steps where antibiotics act with suitable example.

d) Discuss the folate pathway. What are folate antagonists? How does trimethoprim exhibit selective toxicity to bacterial cells?

Q2) Answer any two of the following. **[10]**

a) Draw a neat diagram of neuron & explain the steps involved in neurotransmission. Explain how this process is affected in depression? Give the strategies to overcome this problem.

b) Discuss the life cycle of HIV virus. Which are the drugs to treat HIV? Explain their mode of action.

P.T.O.

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

i) Plant products

ii) DNA interculators

iii) Alkylating agents

Q3) Discuss in brief any three of the following. **[6]**

a) Sleep & sedatives

b) Drug resistance

c) Antimetabolites

d) Leprosy

SECTION - II

Q4) Answer any three of the following. **[9]**

a) Discuss in brief the hyperacidity & the role of proton pump inhibitors.

b) Explain the life cycle of plasmodium & various strategies to control malaria.

c) What is diabetis? Mention the various types of diabetis & discuss any one strategy to manage diabetis.

d) Discuss the common strategies to treat constipation & ulcer.

Q5) Answer any two of the following. **[10]**

a) Explain any two of the following & their management.

i) Hypertension

ii) Myocardial infarction

iii) Congestive heart failure

b) Discuss any three of the following & one drug to treat them.

i) Tuberculosis

ii) Pain

iii) Nausea & Vomitting

iv) Inflammation

c) How does endocrine system maintain healthy state of the body? Discuss the function of hypothalamus and pitutary gland.

Q6) Give mechanism of action of the following drugs (any 4): **[6]**

a) Valproic acid

b) Insulin

c) Vinblastine

d) Mustine

e) Metaprolol

Total No. of Questions : 6]

SEAT No : ____

P 1970

[Total No. of Pages :2

[5325]-403
M.Sc.
DRUG CHEMISTRY
CHD - 463 : Principles and Applications in Drug Design
(2013 Pattern) (Semester-IV)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:

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

SECTION-I

Q1) Answer any three of the following: **[9]**

a) Define following terms:

i) Probe

ii) Expression vector

iii) DNA vaccine

b) How can monoclonal antibodies be used as diagnostic tools as well as drugs.

c) What is antisense technology? How can it be used to treat viral diseases.

d) What is role of bioinformatics in drug discovery and design? Explain how it is used in new drug discovery research.

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

a) Discuss in brief the steps involved in signal transduction pathway involving G - proteins.

b) Define receptor. How does the understanding of receptor structure and function help to design agonists and antagonists. Explain with an example.

c) Discuss recombinant DNA technology. Explain the steps involved in r - DNA construction and the enzymes involved.

d) What is solid phase synthesis? Explain the steps involved in it and enlist the advantages of it.

P.T.O.

Q3) Write short notes on any two of the following: **[4]**

a) Database Handling.

b) Proteomics.

c) Gene Therapy.

SECTION-II

Q4) Answer any three of the following: **[9]**

a) Explain molecular mechanics and quantum mechanics in brief.

b) ACE is an important target for antihypertensive drugs. Its crystal structure is known. How will you design a novel antihypertensive from this information. Explain your approach.

c) Explain De Novo design method used in designing of molecules when structure is unknown.

d) Explain the various terms and their significance in the standard molecular mechanics force field.

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

a) Discuss any two of the following in brief.

i) Topliss manual method

ii) Topliss cluster analysis

iii) Free Wilson method

b) What is QSAR? How is Hansch analysis carried out on a series of analogs of the lead compound? What is equation of best fit? How is it selected?

c) Discuss in brief:

i) Virtual screening ii) COMFA

d) Describe three methods of energy minimization enumerate the strength and weakness of each method.

Q6) Write short notes on any two of the following: **[4]**

a) Highthroughput screening.

b) Prodrugs.

c) Applications of parallel synthesis.

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Total No. of Questions :9]

SEAT No. :

P1971

[Total No. of Pages :5

[5325] - 404

M.Sc.-Semester - IV (New Pattern)

DRUG CHEMISTRY

CHD - 464 A: Bio Informatics, Cheminformatics and Biostatistics in Drug discovery and design.

CHD - 464 B: Current trends in Organic Chemistry, supramolecular, Green Chemistry, Photo chemical and Free radical reactions.

CHD - 464 C: Entrepreneurship Development and Project Managment.

(2013 Pattern) (Semester - IV)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Attempt any two of 464A, 464B, 464C sections only.***
2) ***Each section is for 25 marks.***
3) ***All questions are compulsory.***
4) ***Answer to the two sections to be written in seperate answer books.***
5) ***Figures in right indicate maximum marks.***

CHD - 464A : Bioinformatics, Cheminformatics and Biostatistics in drug discovery and design.

Q1) Answer any three of the following **[12]**

a) Define the Following.

i) Correlation.

ii) Standard Deviation.

iii) Frequency of class.

iv) Coefficient of variation .

b) Obtain the mode for the following Frequency distribution.

Daily Income (In Rupees)	40-50	50-60	60-90	90-120	120-150
No. of persons	22	198	110	95	42

P.T.O.

c) Calculate the quartile deviation for the following data.
100, 24,14, 105, 21, 35, 106, 16, 100, 72, 68, 103, 61, 90, 20

d) Calculate correlation coefficient for the following data.

X	200	500	400	700	300
Y	12	18	16	21	10

Q2) Attempt any two of the following: **[8]**

a) What is meant by Bioinformatics? What is a biological database and enlist it's types.

b) Enlist the gene prediction programmes and describe any one in detail.

c) Define: Proteomics and Enlist the steps involved in proteome analysis.

Q3) Attempt any two of the following: **[5]**

a) Define : Metabolomics. Comment on its importance over Genomics and proteomics.

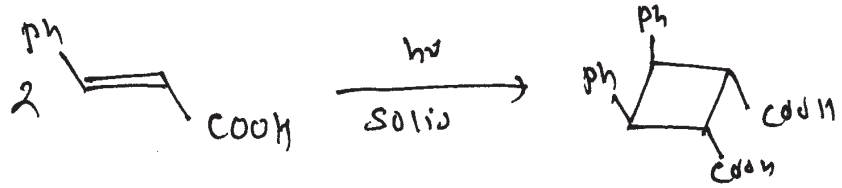
b) What is Chemo informatics. State the use of graph connection tables in cheminformatics.

c) Comment on the Linear notations and canonical representations in cheminformatics.

CHD - 464B : Current trends in organic chemistry: Supra - molecular, Green Chemistry, Photo chemical & free radical reactions

Q4) a) Suggest Mechanism for the following reactions (Any two). **[4]**

i)



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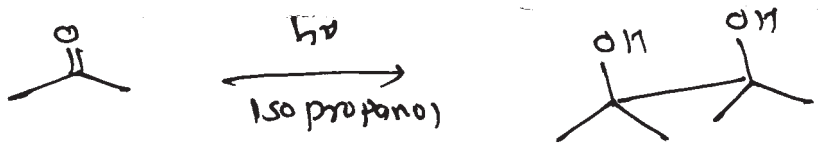
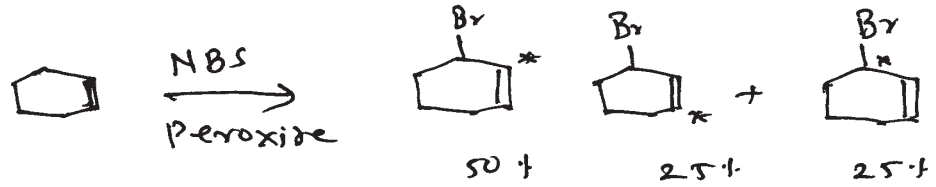
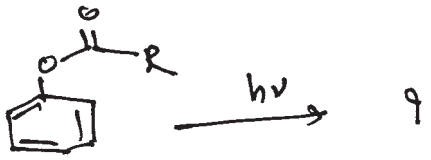
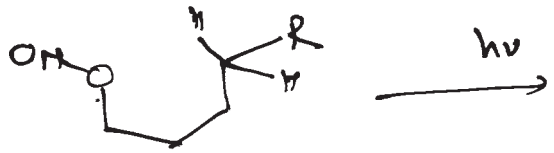
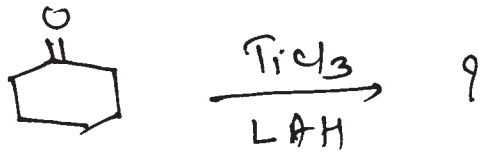


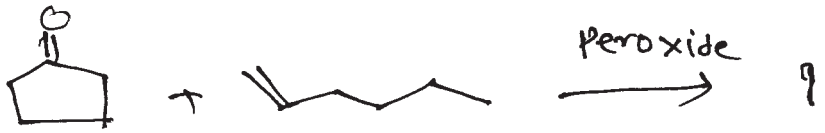
iii) 

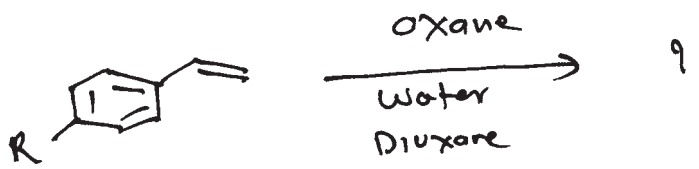
b) Predict the product of the following reactions. (Any four) **[6]**

i) 

ii) 

iii) 

iv) 

v) 

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

a) Explain the concept of supromolecular Chemistry.

b) Write short note on ‘supramolecular reactivity and catalysis’.

c) Explain with examples the advantages of solvent free reactions.

d) Explain the principle “synthetic methods should be designed to maximize the incorporation of all materials used in the process into the final product”.

e) Write short note on different techniques used for green synthesis.

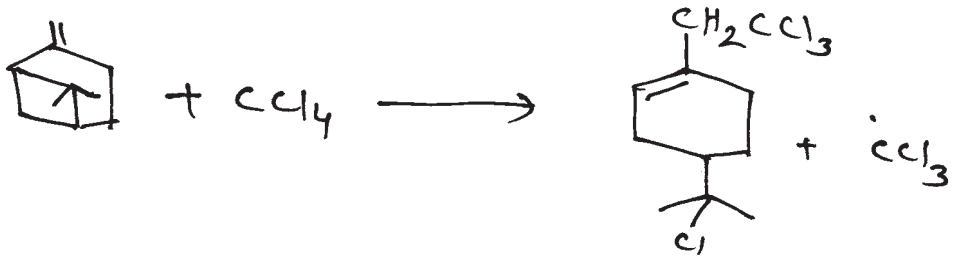
Q6) a) Write short note on any two of the following. **[3]**

i) Photo Ionisation

ii) Cryptands

iii) Formation and stability of free radicals.

b) Give the Mechanism of following reactions. **[2]**



c) Give the examples of organic synthesis invoving the use of bio-catalyst. **[2]**

d) Write short account of photo re-arrangement reactions. **[2]**

CHD - 464C : Enterpreneurship Development and Project Management

Q7) Write short notes on any three of the following. **[6]**

a) Enterpreneurship Development process.

b) Woman Enterpreneur.

c) Creativity and Innovation.

d) Intrapreneur.

Q8) Answer any three of the following **[9]**

a) People with 'High Achievement Motivation' are prone to become an enterpreneur. Explain with the help of McClelland's theory.

b) Explain in brief, 'enterpreneural search and identifications.

c) Give a brief account of Schumpeter theory of enterpreneurship.

d) opportunities for small enterpreneurs in India. Explain.

Q9) Answer any two of the following. **[10]**

a) Explain formulation of business plan.

b) Give a brief account of Factors affecting enterpreneural growth.

c) Explain in brief “conducting Feasibility studies”.