

Total No. of Questions :6]

SEAT No. :

P1526

[Total No. of Pages :4

[5225] - 301

M.Sc.

DRUG CHEMISTRY

CHD-361: Chemistry of Heterocycles and Biologically

Active Compounds

(2013 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks :50

Instructions to the candidates:

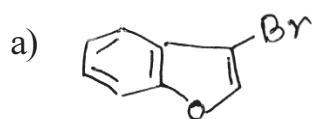
- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Answers to the two sections should be written in separate answer books.

SECTION - I

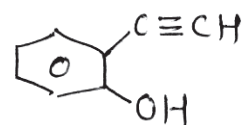
Q1) Explain any four of the following. [8]

- a) 1, 3 - Azoles undergo electrophilic substitution at C – 5 while 1, 2 – azoles at c – 4.
- b) 2 – Methoxy –1, 4 – benzoquinone upon Nenitzescu - indole synthesis gives 6- methoxy indole derivative but not 7 methoxy & 4- methoxy indole derivatives.
- c) 2- Methyl furan and furan -3- carboxylate give 5- aldehyde in Vilsmeier - Haack reaction.
- d) Thiazole is less susceptible to electrophilic substitution than thiophene.
- e) 4 - Chloropyridine could be prepared from pyridine -N - Oxide.

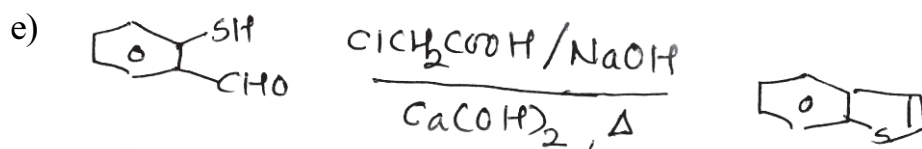
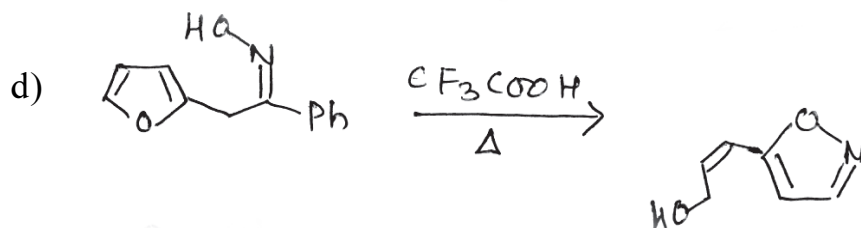
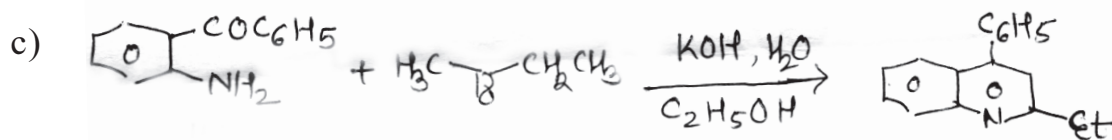
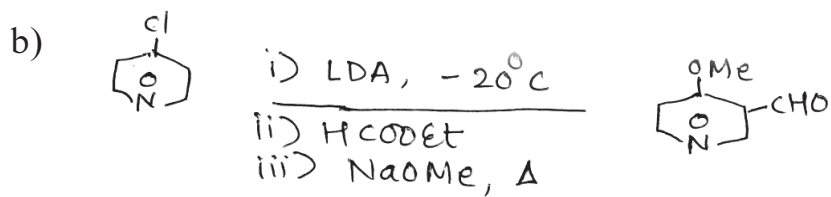
Q2) Suggest the suitable mechanism for any four of the following. [8]



i) n-BuLi, ether,  $-76^{\circ}\text{C}$   
ii)  $25^{\circ}\text{C}$ , 1h (iii)  $\text{H}_3\text{O}^+$



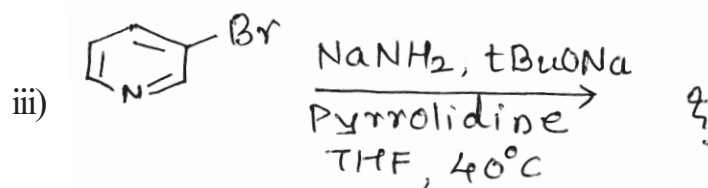
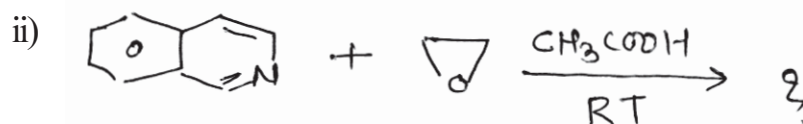
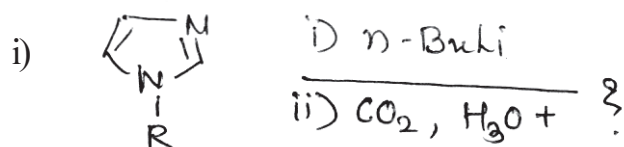
P.T.O.



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

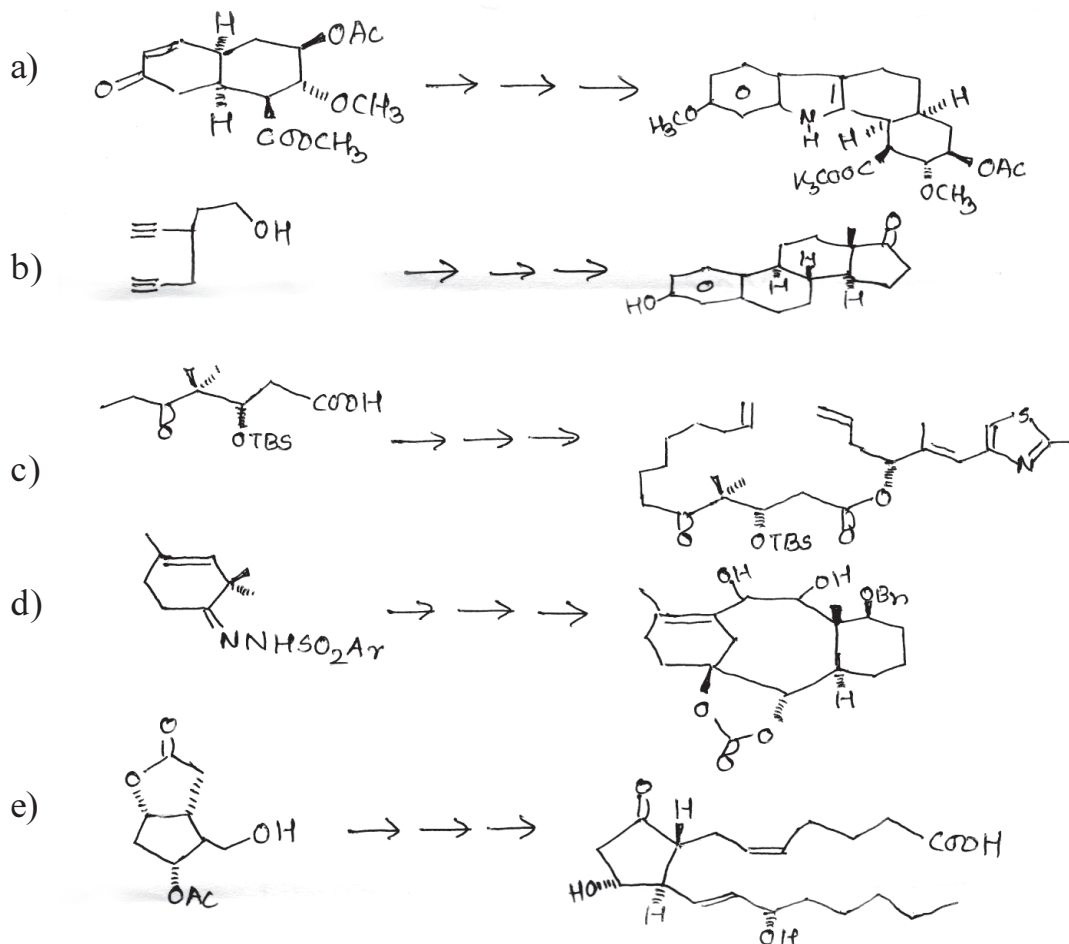
- i) Pechman coumarin synthesis.
- ii) Knorr pyrrole synthesis.
- iii) Fischer - Indole synthesis.

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

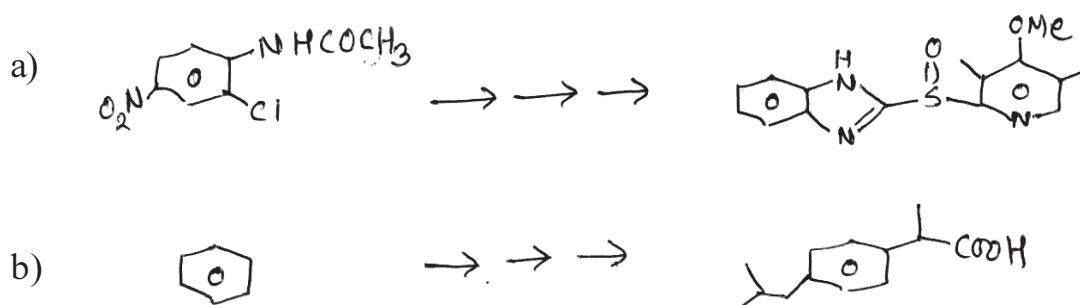


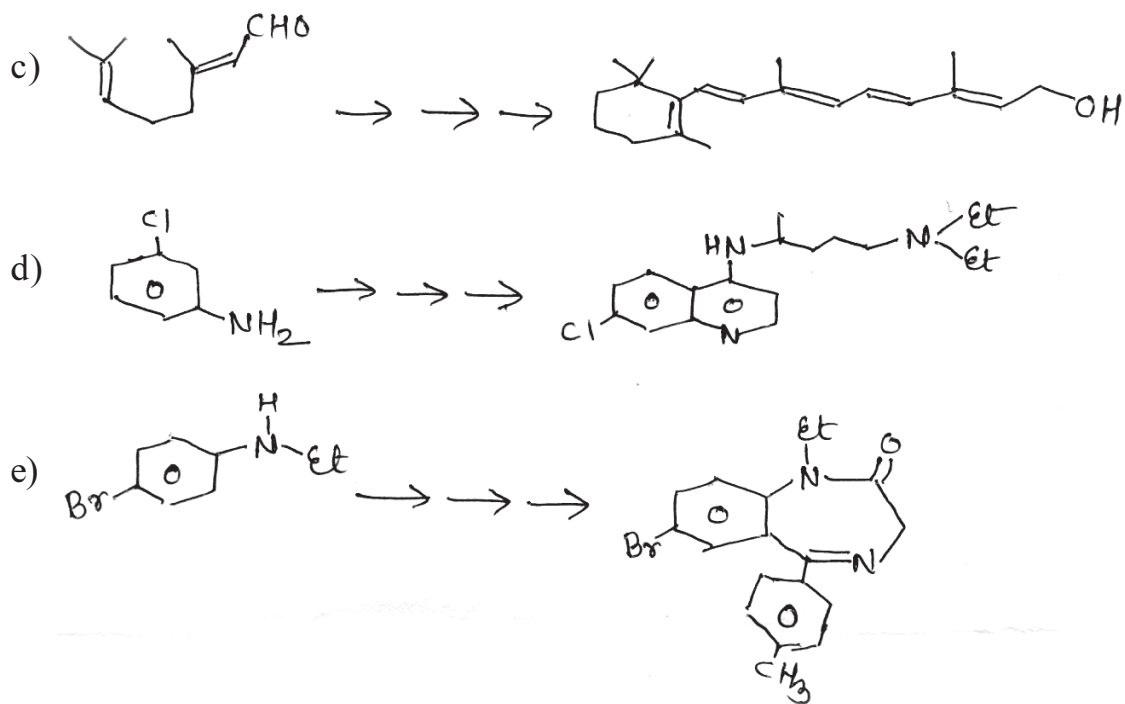
## SECTION - II

**Q4)** Discuss the steps involved in the following transformations. Comment on the steps indicating mechanism and reagents used. (any three) [12]

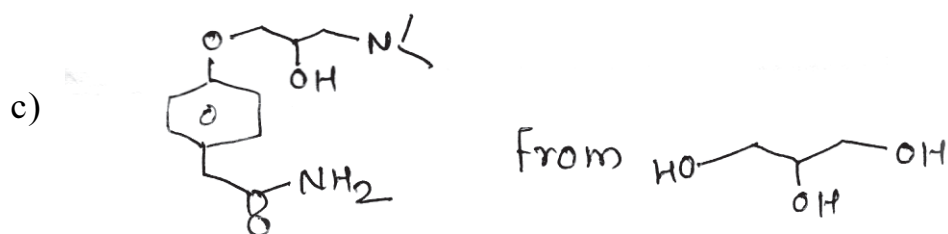
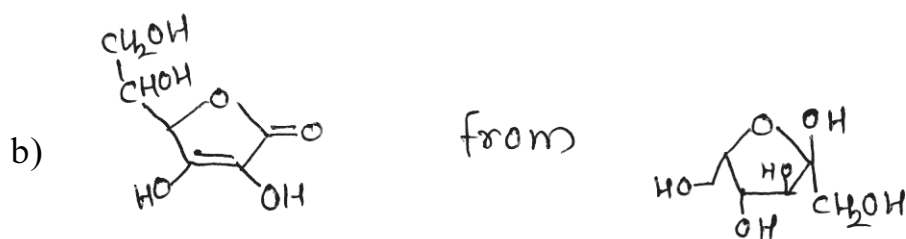
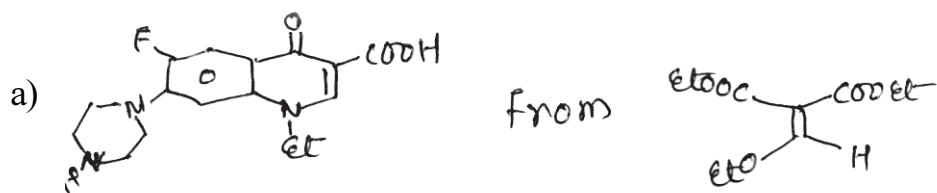


**Q5)** Discuss the steps involved in the synthesis of following drug molecules. Explain the mechanism involved. (any three) [9]





**Q6)** Devise a synthetic pathway for any two of the following from the starting compound shown. **[4]**



Total No. of Questions :6]

SEAT No. :

**P1527**

**[5225]-302**

[Total No. of Pages : 6

**M.Sc.**

**DRUG CHEMISTRY**

**CHD - 362 : Advanced Analytical Methods  
(2013 Pattern) (Semester - III)**

*Time : 3 Hours]*

*[Max. Marks : 50*

*Instructions to the candidates:*

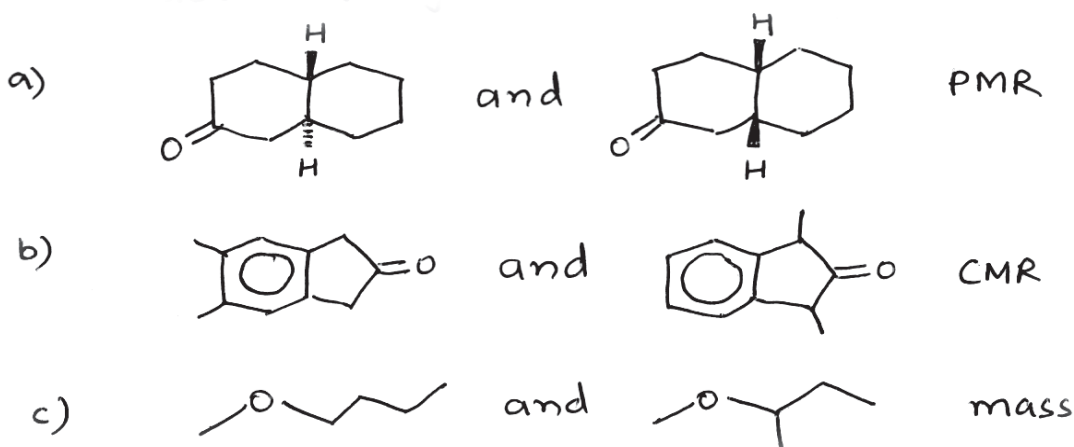
- 1) *All questions are compulsory.*
- 2) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the rightside indicate full marks.*

**SECTION-I**

**Q1) A) Answer any three of the following: [6]**

- a) Aromatic protons are deshielded than aliphatic protons. Explain.
- b) Butanone and butanol can be distinguished by Ms.
- c)  $\text{CDCl}_3$  shows triplet of intensities 1:1:1 at  $77 \delta$  in CMR. Explain.
- d) DEPT is preferred over off - resonance experiment for  $^{13}\text{C}$  signal assignments. Explain

**B) Distinguish the following pairs by spectral method indicated (any two)[3]**



**P.T.O.**

Q2) Answer any four of the following

[10]

a) Deduce the structure



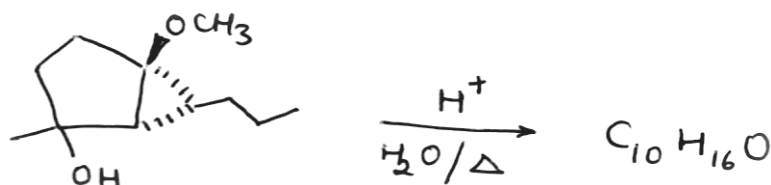
IR : 1680, 1602  $cm^{-1}$

PMR: 3.1(t,6Hz,2H) 3.9(s,3H) 4.5(t,6Hz,2H)

6.75(d,2Hz,1H)6.9(dd,8&2Hz,1H) 8.05(d,8Hz,1H)

b) A compound (M.F :  $C_3H_5ClF_2$ ) in its PMR shows two triplets one at 1.75  $\delta$  and other at 3.63  $\delta$  corresponding to three and two protons with  $J = 7Hz$ . Assign the structure of the compound.

c) Assign the structure



CMR : 14(q) 19.8(q) 23(t) 30.8(t) 34.7(t) 37.4(t) 48.1(d) 123.7(d) 134.2(s) 213.2(s)

PMR: 0.88(t,7.2Hz,3H) 1.2–1.6(m,4H) 1.75(s,3H) 2.3–2.5(m,4H) 2.71(bs,1H) 5.37(m,1H)

d) Predict the structure



IR : 1690, 1725 $cm^{-1}$

PMR : 4.25(q, 6.7Hz,2H) 3.8 (t, 7Hz, 4H)

2.45 (t, 7H<sub>z</sub>, 4H) 1.3(t, 6.7H<sub>z</sub>, 3H)

CMR : 207(s) 155(s) 62(t) 43(t) 41(t) 15(q)

e) Deduce the structure



UV:265 nm ( $\epsilon = 15,000$ )

IR:3600,1600,1530,1495,1360  $cm^{-1}$

PMR: 2.9(s,6mm,exch.)5.0(s,12mm)7.6(m,18 mm) 8.15(dd,2&7Hz,6mm)

CMR : 65(t) 123(d) 128(d) 130(d) 132(d) 148(s)

Q3) Write short note on any three of the following

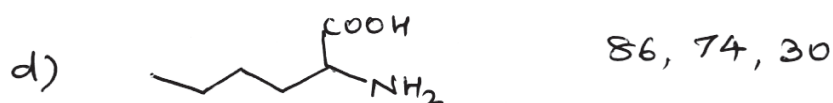
[6]

- Distortionless Enhancement by polarization Transfer
- Factors affecting geminal coupling constants
- Difference between CW and FT NMR
- Various analyzers used in Ms

**SECTION - II**

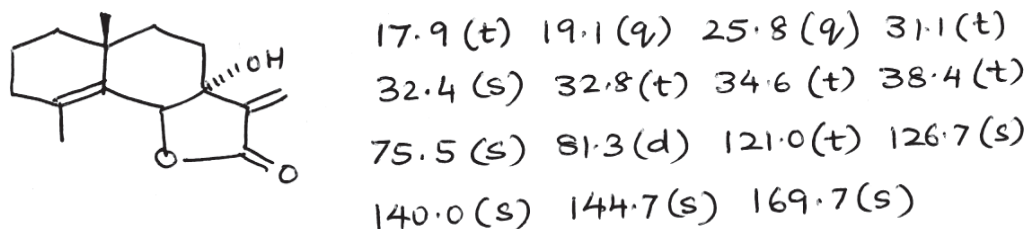
Q4) A) Explain the genesis of following ions (any three)

[6]

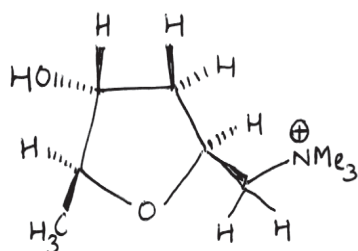


B) How could mass fragmentation be used to follow the progress in dehydration of 1-methyl cyclohexan - 1- ol. [2]

Q5) A) Assign the signals to various carbons in the following compound. [3]



B) Assign the chemical shift values to various protons in the following structure. Use the NOE results to assign the protons. Justify your answer. [4]



1.16 (d, 6.5 Hz, 3H) 1.86 (ddd, 12.5,  
 9.5 & 5.5 Hz, 1H) 2.02 (ddd, 12.5,  
 2 & 6 Hz, 1H) 3.36 (s, 9H)  
 3.54 (dd, 13 & 9 Hz, 1H)  
 3.74 (dd, 13 & 1 Hz, 1H)  
 3.92 (dq, 2.5 & 6.5 Hz, 1H)  
 4.03 (m, 1H) 4.3 (d, 3.5 Hz, 1H, exch)  
 4.68 (m, 1H)

NOE expt:

irradiate at	change at
a) 4.68 $\delta$	7% enhancement at 3.92 $\delta$
b) 1.16 $\delta$	15% enhancement at 1.86 $\delta$

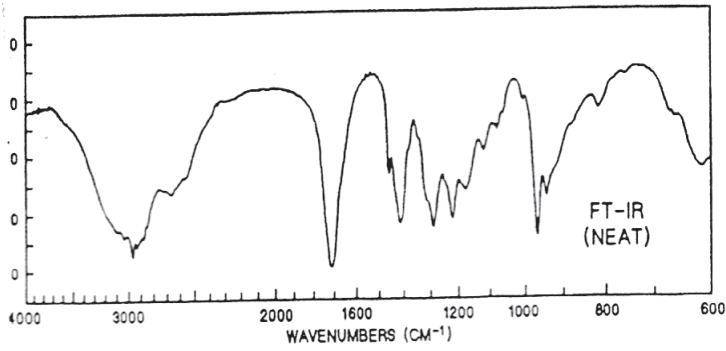
Decoupling expt:

irradiate at	change at
a) 1.16 $\delta$	3.92(dq) $\rightarrow$ d(2.5Hz)
b) 4.68 $\delta$	i) 3.54 (dd) $\rightarrow$ d(13Hz)
	ii) 3.74(dd) $\rightarrow$ d(13Hz)
	iii) 1.86(ddd) $\rightarrow$ dd(12.5 & 9.5Hz)
	iv) 2.02(ddd) $\rightarrow$ dd(12.5&2Hz)

C) Distinguish between ESR and NMR [2]

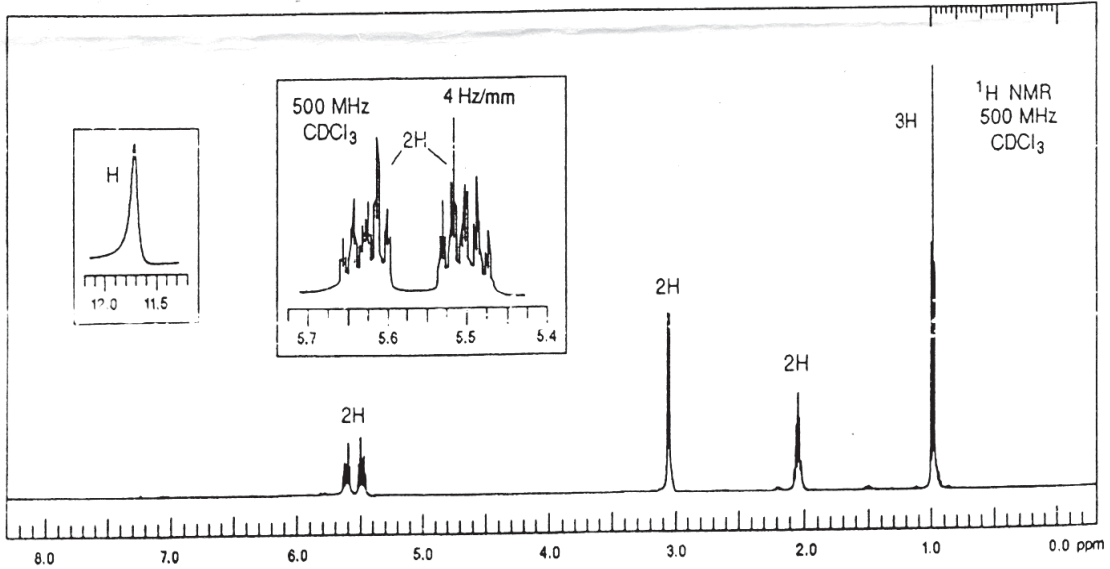
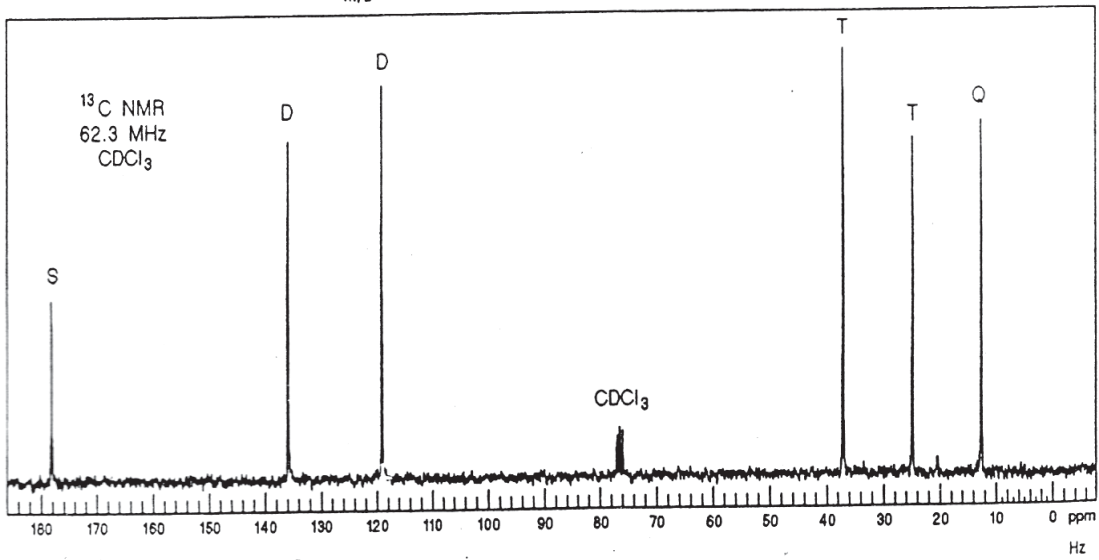
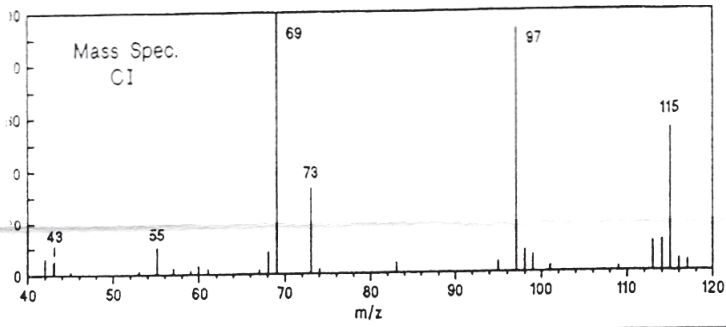
**Q6)** A compound exhibits spectral properties shown on the attached sheet. suggest the structure and explain the observed spectral data. [8]



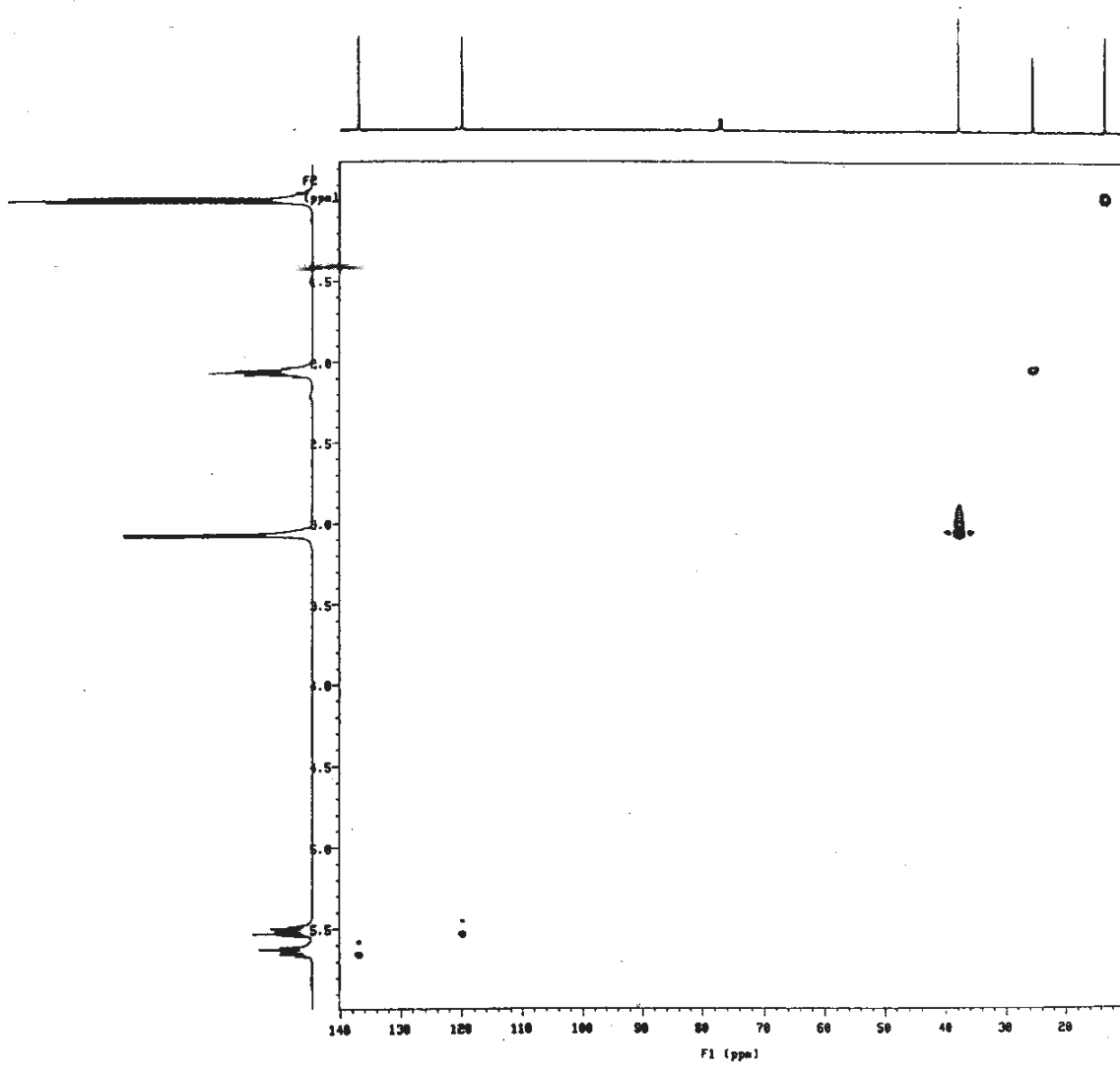


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UVλ<sub>max</sub> = BLANK



HETCOR



Total No. of Questions : 6]

SEAT No. :

**P1528**

**[5225]-303**

[Total No. of Pages : 2

**M.Sc.**

**DRUG CHEMISTRY**

**CHD - 363 : Microbiology, Immunology & Drug Discovery & Development  
(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 to be written in separate answer books.*
- 3) *Figures to right indicate maximum marks.*

**SECTION-I**

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

- a) Describe different parts of a fermenter & their function.
- b) Explain the screening protocols for isolation of microorganism providing antibacterial compound.
- c) What is the need for effluent treatment. Explain the process.
- d) Explain i) Industrial strain ii) Media design
- e) Discuss in brief the bacterial growth curve. Explain the various phases.

**Q2) Answer any two of the following. [8]**

- a) Discuss the classification of immunity giving suitable examples.
- b) Give a brief account of immunodiagnostics. Explain RIA or ELISA.
- c) Explain i) Hyper sensitivity ii) Immuno suppressants

**Q3) Explain any five in brief. [5]**

- a) Immunomodulator
- b) BOD
- c) Drug
- d) Nitrogen fixers
- e) Auto immunity
- f) LD<sub>50</sub>
- g) Therapeutic index

**P.T.O.**

## SECTION-II

**Q4)** Answer any three of the following. **[12]**

- a) Discuss in brief how drugs show biological activity. Explain with two different drug targets.
- b) Explain the ADME of drug action, how does this affect the bioavailability of a drug.
- c) Discuss in brief the planning & observations done in clinical trials. What is the role of FDA.
- d) Explain bioassays. What are the characteristics of an ideal bioassay?
- e) Give an account of the steps involved in rational drug discovery.

**Q5)** Answer any three of the following. **[9]**

- a) What is a patent. Explain invention, novelty & prior art in patent.
- b) Discuss in brief the need of so many dosage forms of drugs.
- c) Discuss how chronic toxicity & acute toxicity is evaluated.
- d) Discuss the functions of
  - i) R &D
  - ii) Process development in pharma industry

**Q6)** Explain any four in brief. **[4]**

- a) SAR
- b) Pharmacodynamics
- c) Pharmacopeia
- d) Phase I metabolism
- e) Bioequivalence



Total No. of Questions : 6]

SEAT No. :

P1529

[Total No. of Pages : 4

[5225] - 304

M.Sc.

**DRUG CHEMISTRY**

**CHD-364 : Stereochemistry, Asymmetric Synthesis and Pericyclic Reactions**

**(2013 Pattern) (Semester - III) (New)**

Time : 3 Hours]

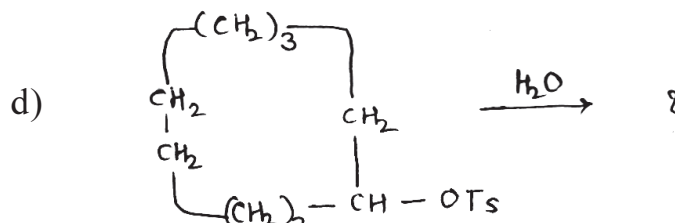
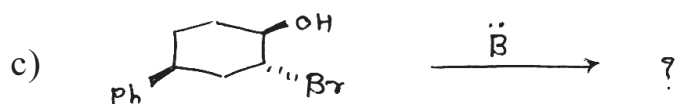
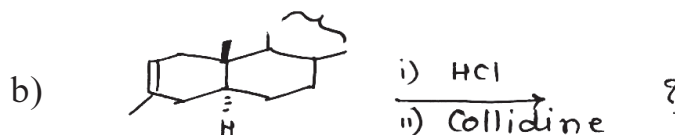
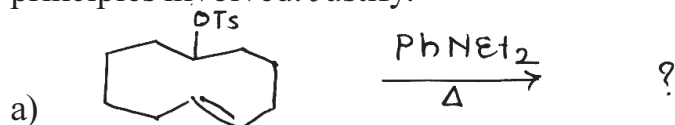
[Max. Marks :50

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)** Predict the product/s in any five of the following and explain the stereochemical principles involved. Justify. **[10]**

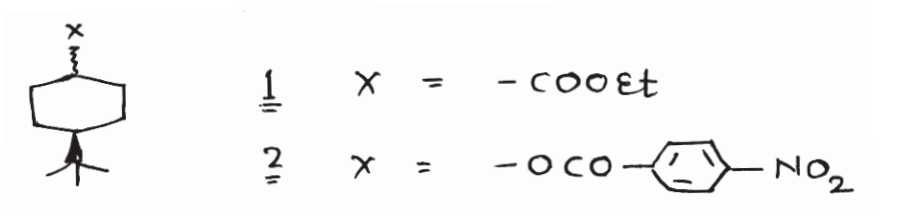


P.T.O.

Q2) Answer any two of the following :

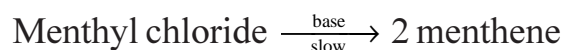
[10]

- a) i) Reaction of cyclohexene with peracid followed by hydrolysis gives trans, 1, 2 diol whereas similar reaction of trans cyclodecene gives trans 1, 6 diol.
- ii) The relative rates of saponification are  $K_{trans}/K_{cis} = 20$  while for 2 are  $K_{trans}/K_{cis} = 2.5$

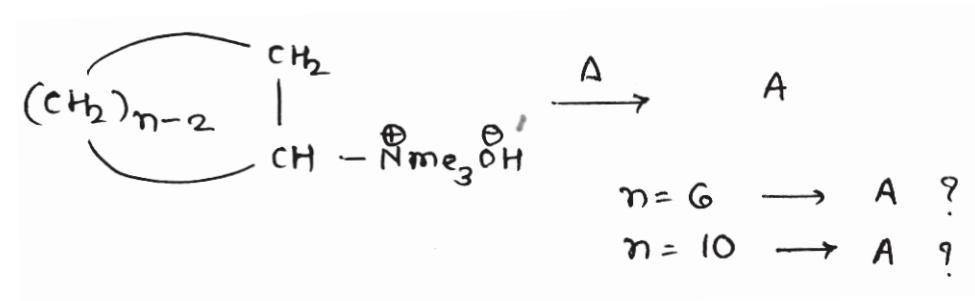


- b) i) Draw both possible conformations of cis-anti cis perhydrophenanthrene. Indicate giving reasons which is more stable.
- ii) Trans g-methyl decalin is more stable than its cis isomer by 3.35 KJ/mol. Explain.

- c) i) Neomenthyl chloride  $\xrightarrow[\text{fast}]{\text{base}}$  3 menthene.



- ii) Explain the formation of products & rate of elimination reactions.



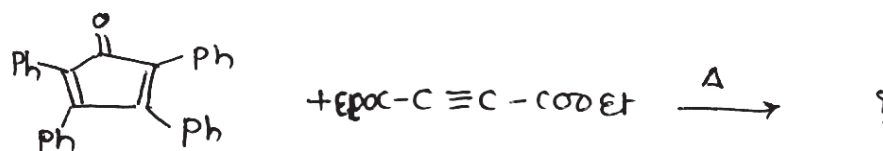
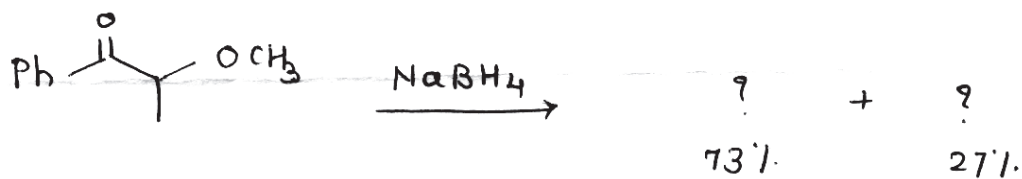
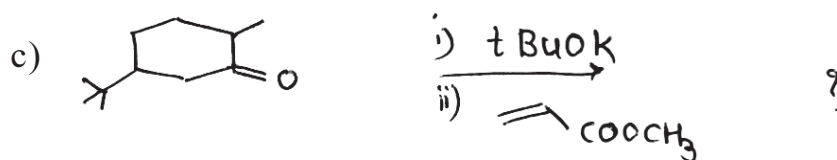
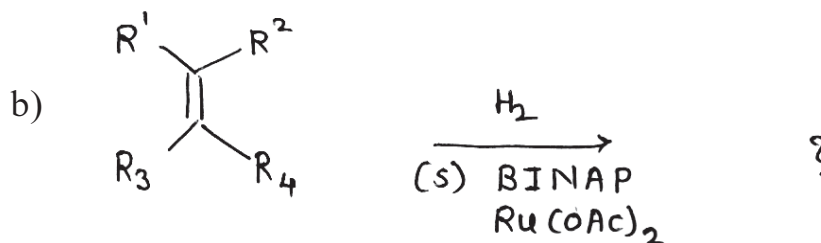
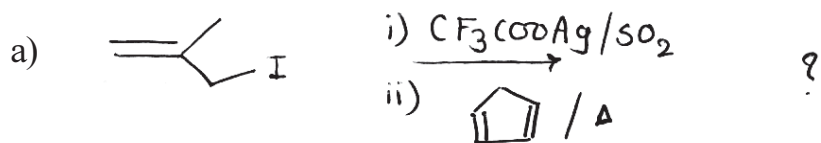
Q3) Write short note on :

[5]

- a) Van Auwer's Skita Rule.
- b) 2-Alkyl Keto effect.

**SECTION - II**

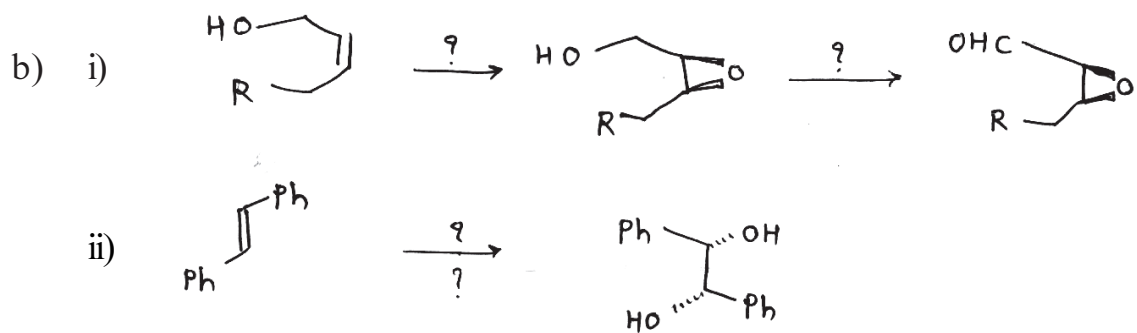
**Q4)** Predict the product/s & write the stereochemistry. Justify your answer  
(any five) **[10]**



**Q5)** Attempt any two of the following :

[10]

- a) i) What are the products of the following reaction.
- 1) (antra) ethylene (supra) cis 2 butene cycloaddition.
  - 2) (supra) (supra) cis 2 butene cycloaddition.
- ii) Write a note on chiral pool.



- c) Write a note on Cram's chelate model.

**Q6)** With the help of correlation diagram show that Diels-Alder reaction is thermally allowed. [5]





## DRUG CHEMISTRY

CHD - 461 : Advanced Organic Synthesis, Principles and Strategies  
(2013 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 50

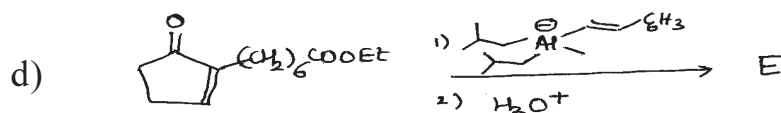
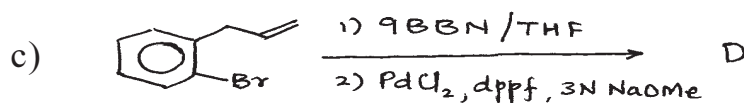
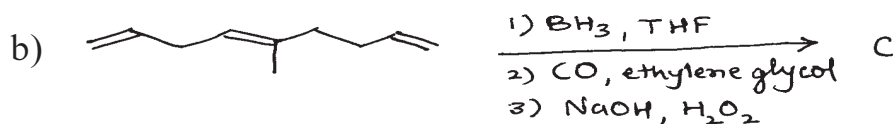
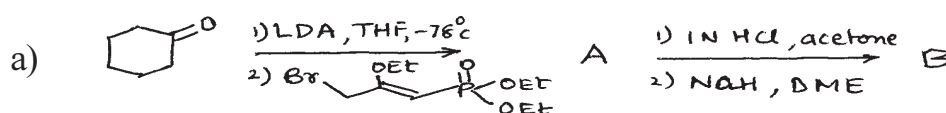
Instructions to the candidates:

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- 2) Answers to the two sections should be written in separate answer books.
- 3) Figures to the right indicate full marks.

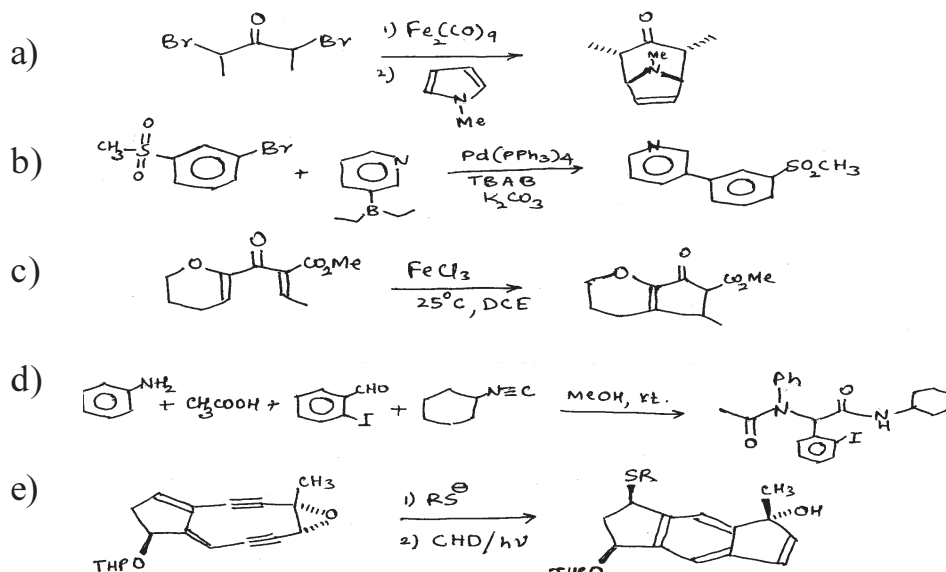
SECTION - I

Q1) Predict the major products of the following.

[8]

Q2) Suggest the mechanism in any four of the following.

[8]

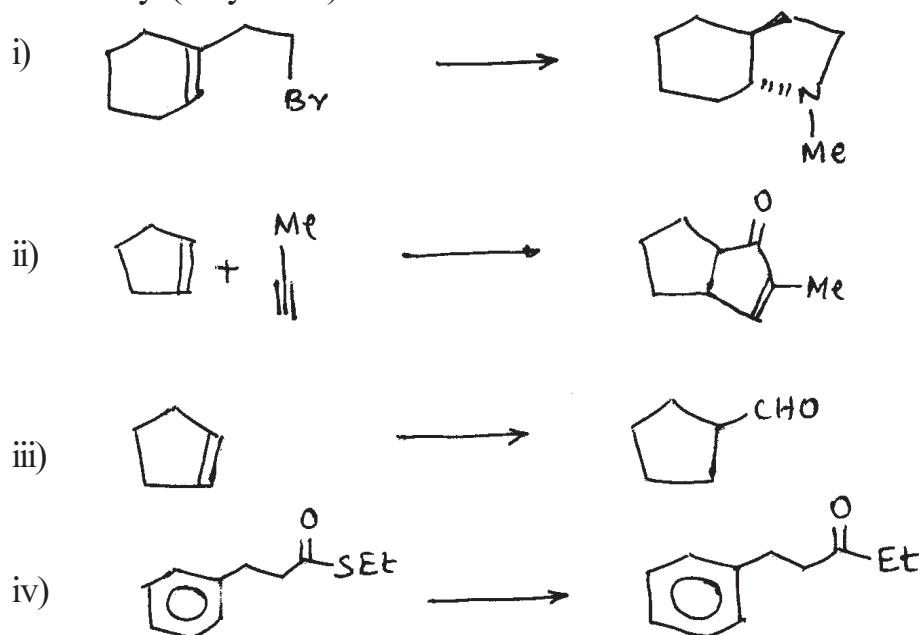


P.T.O.

Q3) a) Explain any two of the following. [3]

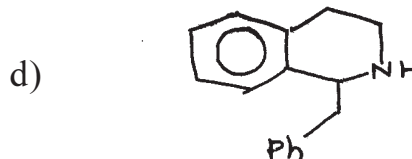
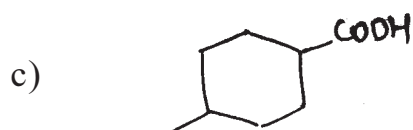
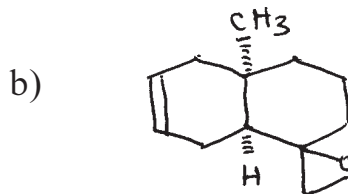
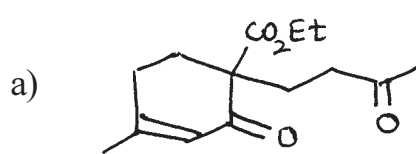
- i) Copper catalyzed azide cycloaddition give 1, 4 - disubstituted triazole while Ruthenium catalyzed azid-alkyne cycloaddition gives 1, 5 - disubstituted regioisomer.
- ii)  $\alpha$ -pinene derived organoboranes can be used to prepare optically active alcohols.
- iii) Role of  $\text{CuCl}_2$  in wacker's oxidation reaction.

b) Carry out the following transformation using Boron/transition metal chemistry. (Any three): [6]



### SECTION - II

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



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

Carry out the following transformations



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

- THP protection is preferred over methyl ether protection of hydroxyl group. Explain.
- Fmoc protection is deprotected under basic conditions while BOC is deprotected under acidic conditions. Explain.
- 1, 6-dicarbonyl compounds can be synthesized by reconnection approach. Explain.

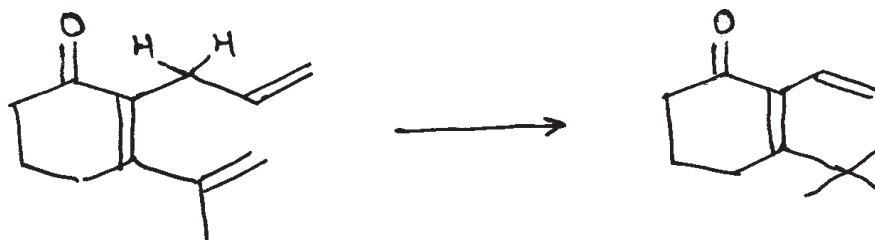
**Q6) a)** Answer any two of the following. [4]

- Explain the salient features of Green Chemistry.
- Discuss the importance of the following in organic synthesis
  - Ionic liquids
  - Micro wave
- Explain why convergent synthesis is better than linear synthesis.

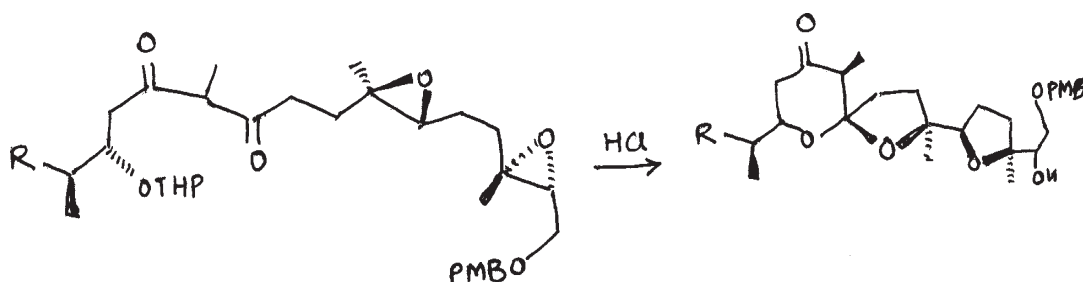
b) Answer any two of the following.

[4]

i) Explain the steps involved in the following reaction.



ii) Explain the steps involved in the following Domino reaction.



iii) Give one reaction with a reagent for each synthesis given below.



★ ★ ★

Total No. of Questions : 6]

SEAT No. :

**P1531**

[5225]-402

[Total No. of Pages : 3

**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) *Answers to the two sections should be written in separate answer books.*
- 3) *Figures to the right indicate full marks.*

**SECTION-I**

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

- a) Give a brief account of macrolide antibiotics. Explain their mechanism of action.
- b) Discuss the steps involved in protein biosynthesis, protein synthesis inhibitors and their uses.
- c) Give a brief account of discovery of penicillins. Discuss semisynthetic penicillins and their advantages over.
- d) What are antibiotics ? How are they classified? Discuss their selective toxicity.

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

- a) Discuss in brief the role of following class of compounds in cancer management.
  - i) Antimetabolites.
  - ii) DNA - alkylators.
  - iii) Antimitotics
- b) Explain the phenomenon of neuronal transmission how this process is affected in depression. Discuss any two classes of antidepressant agents.
- c) Give a brief account of fungal diseases and role of nystatin, Huconazole and griseofulvin as antifungal agents.

**P.T.O.**

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

- a) Malaria.
- b) Tuberculosis.
- c) Nucleoside analog antivirals
- d) Anticonvulsants.

### **SECTION-II**

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

- a) Describe the functioning of pancreas. What happens in diabetes? Explain the use of following in treatment of diabetes.
  - i) Elitezones
  - ii) Biguanides
- b) Explain viral life cycle and discuss the role of acyclovir, AZT & oseltamivir in treatment of viral diseases.
- c) Give an brief account of common GIT disorders. Explain ulcers and approaches to treat ulcers.
- d) Describe enzyme inhibitors and their role in disease management. Discuss with suitable examples their role as antibacterial and anticancer agents.

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

- a) Discuss the following in brief.
  - i) Inflammation
  - ii) Analgesics
- b) Explain how the following groups of drugs help in management of CVS disorders.
  - i) Organic nitrates
  - ii)  $\beta$  - Blockers
  - iii) Cardiac glycosides
- c) Discuss in brief the organisation of the Endocrine system. Explain positive and negative feedback mechanisms utilised in maintaining homeostasis with examples.

**Q6)** Discuss the mode of action and uses of any three of the following. **[6]**

- a) Ciprofloxacin.
- b) Phenobarbital.
- c) Dapsone.
- d) Roxithromycin.
- e) Metronidazole.



Total No. of Questions :6]

SEAT No. :

**P1532**

**[5225]-403**

[Total No. of Pages : 3

**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) *Answer 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: **[09]**

- a) Explain applications of restriction enzymes in genetic engineering.
- b) Define the terms.
  - i) Vector
  - ii) PCR
  - iii) Monoclonal antibodies.
- c) Give applications of antisense therapeutic agents.
- d) Discuss in brief the steps involved in making recombinant DNA & its products.

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

- a) Discuss the receptor theories of drug action.
- b) Discuss the basic features of prodrugs. Explain how does it helpful in improving absorption & lowering toxicity.

***P.T.O.***



- c) What is combinatorial chemistry? Discuss how it is used to make large number of compounds?
- d) Explain in brief membrane bound receptors and the steps involved in signal transduction.

**Q3)** Explain any two of the following **[4]**

- a) DNA vaccine
- b) Physicochemical factors involved in drug-receptor interactions
- c) Transgenic animals as disease models.

### **SECTION-II**

**Q4)** Answer any three of the following. **[12]**

- a) Explain the significance of following physicochemical parameters in QSAR-
  - i)  $\pi$
  - ii)  $\sigma$
  - iii) Es.
- b) Explain in brief-
  - i) Quantum mechanics
  - ii) Monte Carlo search
  - iii) 3D QSAR
- c) Discuss the various methods of structure based drug design. Give example of how these methods have been used to design some useful drugs.
- d) Discuss the role of -
  - i) Ion channel receptors.
  - ii) Protein kinase receptors.

**Q5)** Answer any three of the following.

**[09]**

- a) Explain the Topliss approach for an aromatic substituent. How is it useful in selecting proper substituent in drug development?
- b) Discuss the signalling mechanism for Tyrosine kinase family.
- c) How will you proceed to design a novel drug using computers as inhibitor at ACE (Angiotensin converting enzyme) inhibitor. If the x-ray crystal structure of ACE is known.
- d) Discuss the function of 7-TM superfamilies. Explain their role in detail & the mechanism involved.

**Q6)** Explain any Two of the following.

**[04]**

- a) Antiport & symport.
- b) Correlation coefficient.
- c) Equation of best Fit in QSAR.



Total No. of Questions :9]

SEAT No. :

[Total No. of Pages :5

**P1533**

**[5225] - 404**

**M.Sc.**

**DRUG CHEMISTRY**

**CHD-464 A : Bioinformatics, Cheminformatics and Biostatistics in Drug Discovery and Design**

**CHD-464 B : Current Trends in Organic Chemistry, Supramolecular, Green Chemistry, Photochemical and Free Radical Reactions**

**CHD-464 C : Entrepreneurship Development and Project Management**

**(2013 Pattern) (Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks :50*

*Instructions to the candidates:*

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

**CHD-464 A : Bioinformatics, Cheminformatics and Biostatistics in Drug Discovery and Design**

**Q1) Answer any three of the following :**

**[12]**

- a) Define the following.
  - i) Class limits.
  - ii) Open End Class.
  - iii) Less than Cumulative Frequency.
  - iv) Relative Frequency.

**P.T.O.**

b) Find the mean for the following data.

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50
No. of Students	5	12	16	70	85

c) Obtain the variance for the following distribution.

Class interval	40 - 45	45 - 50	50 - 55	55 - 60
Frequency	10	17	23	40

d) 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

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

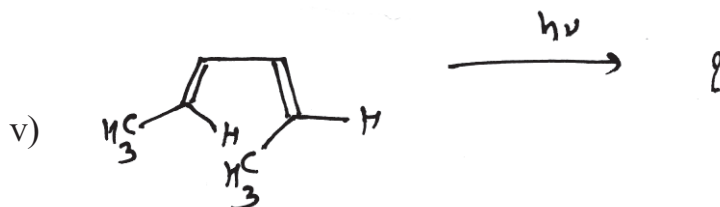
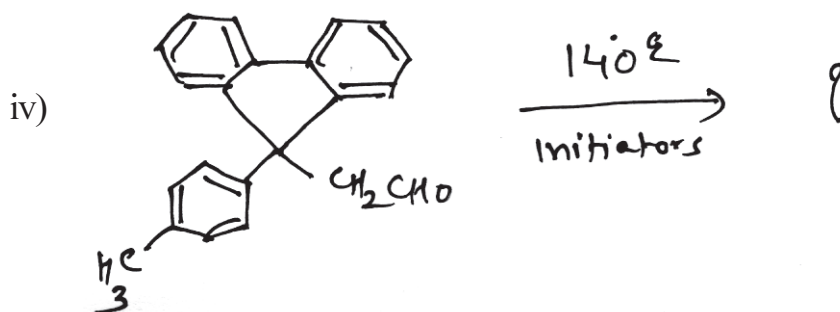
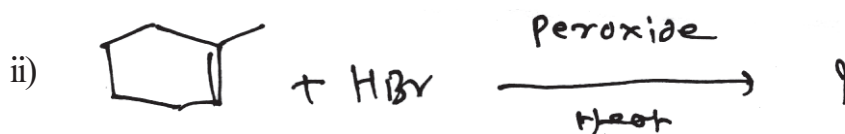
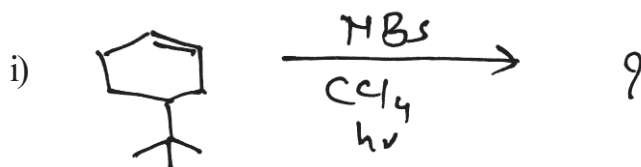
- a) State the promoter and regulatory elements detection programmes. Describe any one in brief.
- b) What is Metabolomics? How is it useful in Bioinformatics.
- c) Short Note : Proteome analysis of an organism.

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

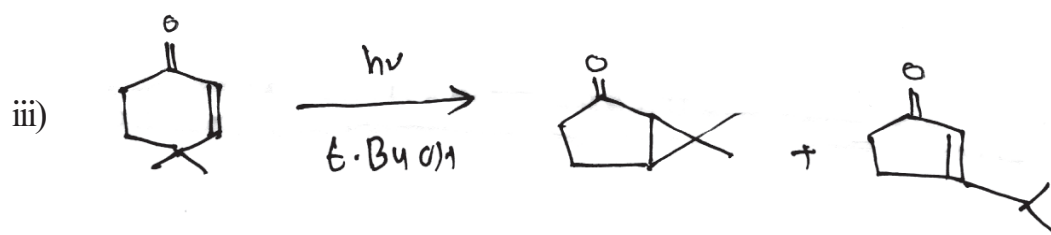
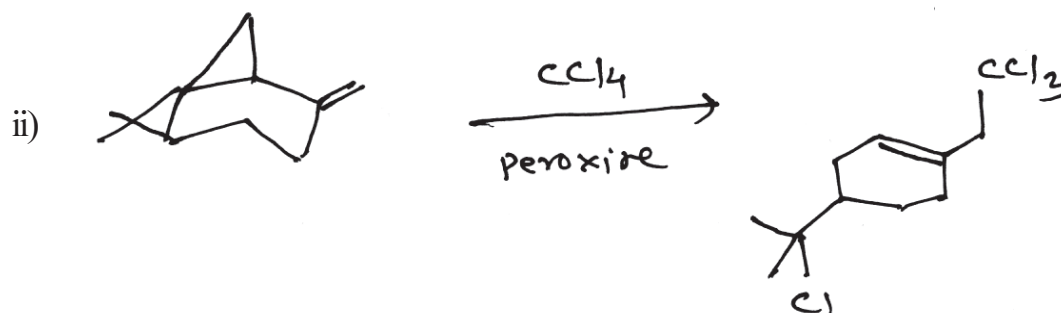
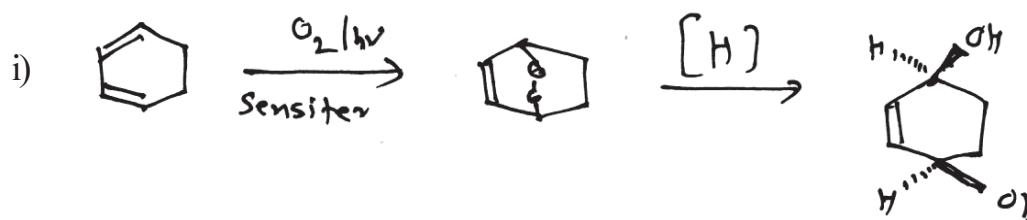
- a) What is cheminformatics. Add a note on it's significance.
- b) What is a Biological database. State it's types.
- c) Short Note on : Graph connection tables. (In cheminformatics)

**CHD-464 B : Current Trends in Organic Chemistry, Supramolecular, Green Chemistry, Photo chemical & Free Radical Reactions**

**Q4) a)** Predict the product of the following reactions (Any Four) : **[6]**



b) Suggest the mechanism & Explain (Any two) [4]



Q5) Answer the following questions (Any Four) [6]

- Explain how protecting groups reduce the atom economy of the reaction.
- Write short note on photo-fries rearrangement.
- Explain the different methods for formation of free radical.
- Explain molecular channels and transport processes.
- Give the principles of molecular association and organisation with reference to supramolecular chemistry.

Q6) a) Write short note on any two : [3]

- Molecular devices and nano technology.
- Solvent free reactions.
- Beckmann rearrangement.

- b) Answer the followings (Any Four) : [6]
- i) Give reaction for synthesis of aziridine.
  - ii) Heck reaction in aqueous phase.
  - iii) Give short account of use of micro wave technology in organic synthesis.
  - iv) Explain the use of bio catalyst in organic synthesis with few examples. How bio - catalysts are superior?
  - v) Give the advantages of use of ionic liquids in organic synthesis.

### **CHD-464 C : Entrepreneurship Development and Project Management**

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

- a) Types of Entrepreneur.
- b) Innovation Theory of Entrepreneurship by schumpeter.
- c) Entrepreneurship Development Process.
- d) Business plan.

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

- a) Explain the evolution of term 'Entrepreneur'.
- b) Explain the problems faced by women entrepreneur.
- c) Entrepreneurship does not emerge spontaneously. Explain.
- d) Discuss in brief common errors made in writing a business plan that make it failure.

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

- a) Discuss factors affecting enterprenurial growth.
- b) Explain various stages involved in Formulation of business plan.
- c) Give a brief account of enterpreneural search and identification.

