Total No. of Questions :6]

SEAT No. :

P1957

[Total No. of Pages : 5

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M.Sc.

DRUG CHEMISTRY

CH - 361 : Chemistry of Heterocycles and Biologically Active Compounds

(2008 Pattern) (Semester - III)

Time : 3 Hours] *[Max. Marks :80*

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. **[12]**

a) Electrophilic substitution of pyridine N-oxide occurs at C_4 -position. Explain.

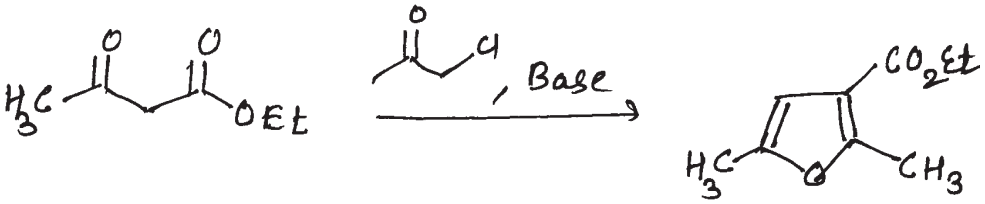
b) Pyrimidine is resistant to eletrophilic substitution. Explain.

c) Explain the reactivity of pyrrole and indole with $^{\oplus}NO_2$.

d) Furan can be synthesized from pentose. Explain.

e) 4- chloropyridine easily undergo hydrolysis in warm water. Explain.

Q2) Suggest the suitable mechanism for any four of the following. **[12]**

a) 

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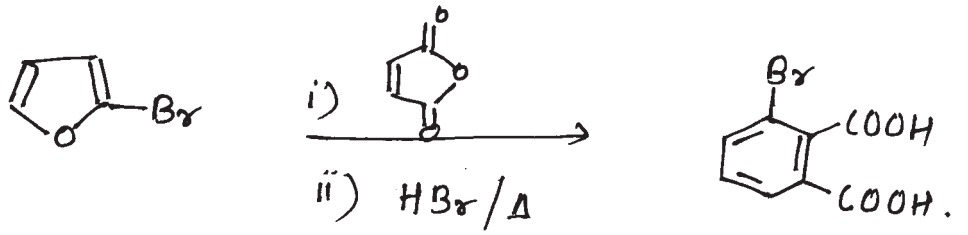
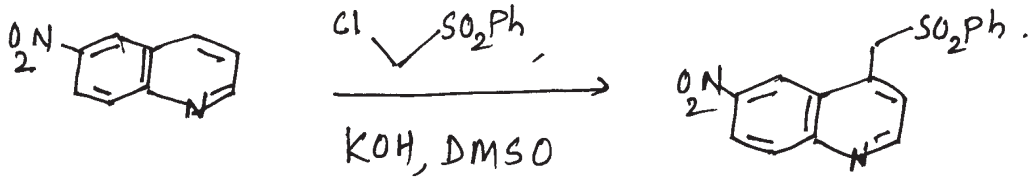
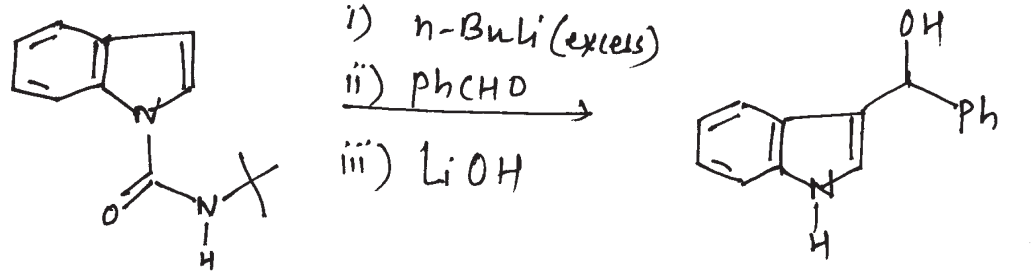
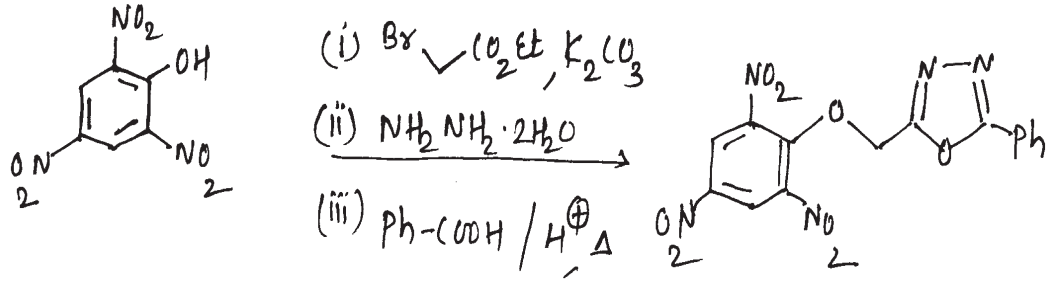
b) 

c) 

d) 

e) 

Q3) a) Write short notes on any three of the following. **[9]**

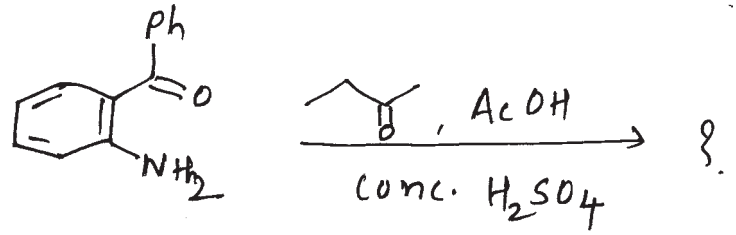
i) Pechmann coumarin synthesis.

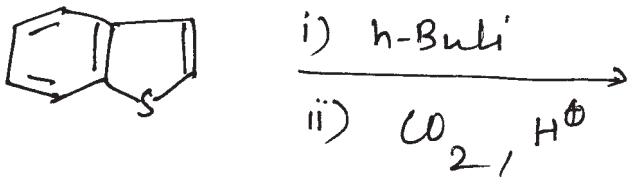
ii) Gabriel Synthesis of thiazole.

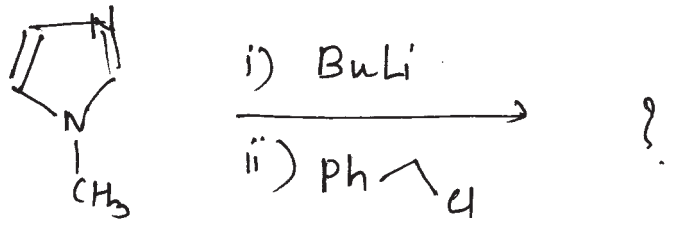
iii) Pictet- Spengler synthesis.

iv) Hinsberg synthesis of thiophene.

b) Predict the products with suitable mechanism for any two of the following. **[7]**

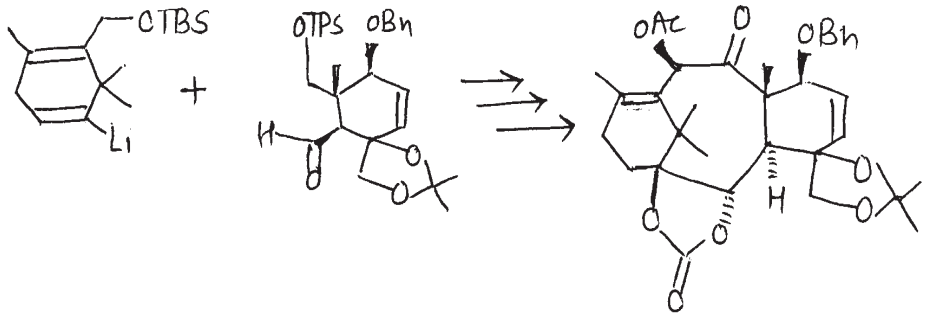
i) 

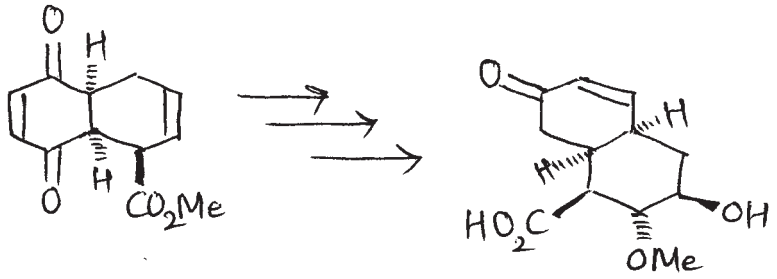
ii) 

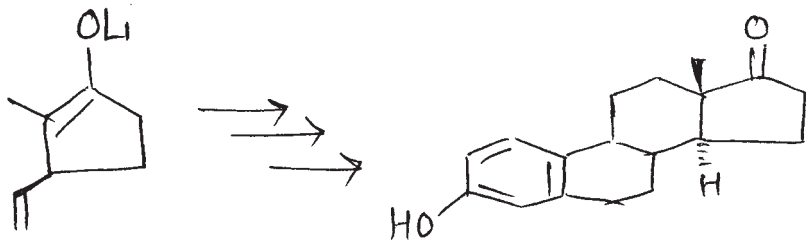
iii) 

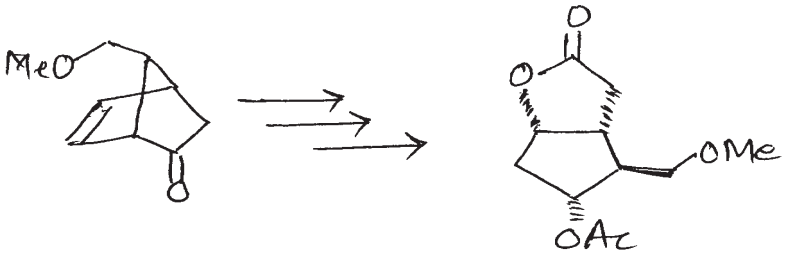
SECTION - II

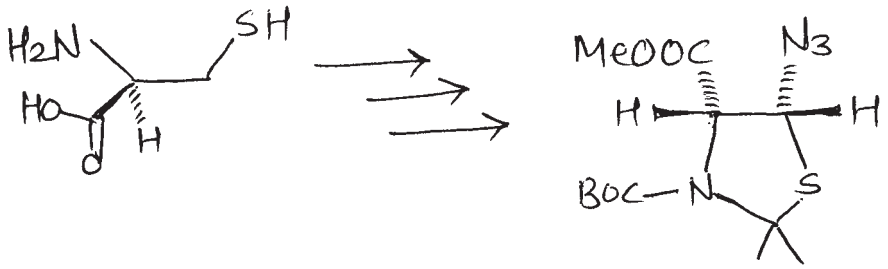
Q4) Discuss the steps involved in the following transformations, comment on steps indicating mechanism and reagents used (any three). **[15]**

a) 

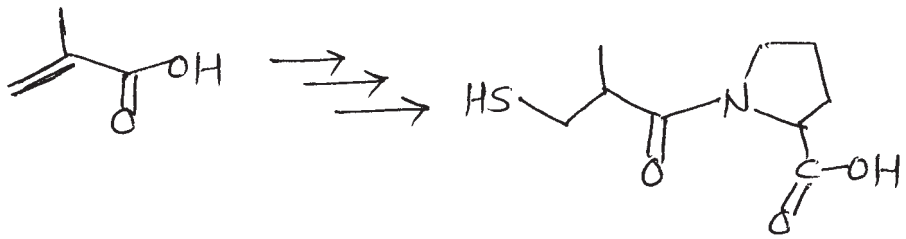
b) 

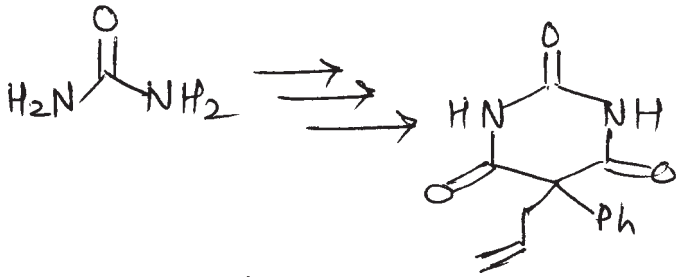
c) 

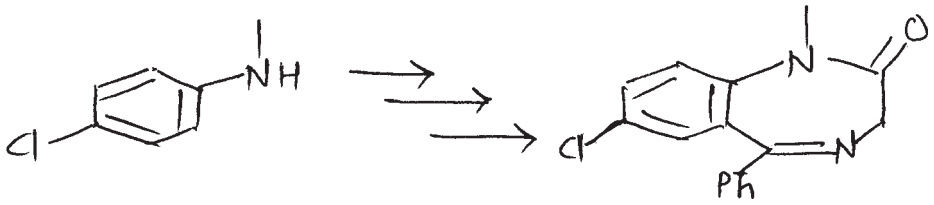
d) 

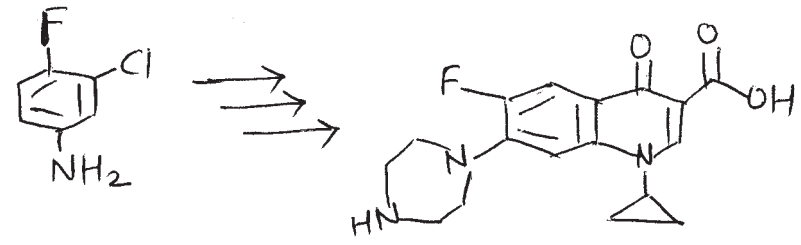
e) 

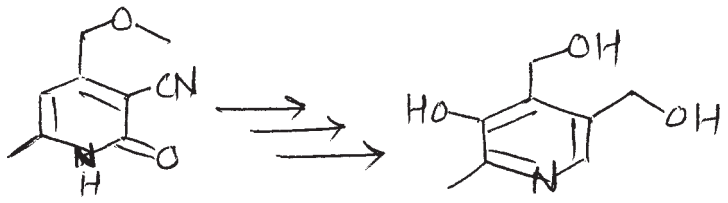
Q5) Discuss the steps involved in the synthesis of following drug molecules. Explain the mechanism involved (any four). **[16]**

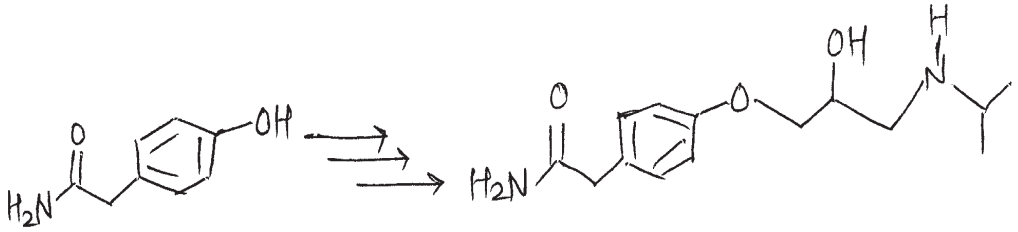
a) 

b) 

c) 

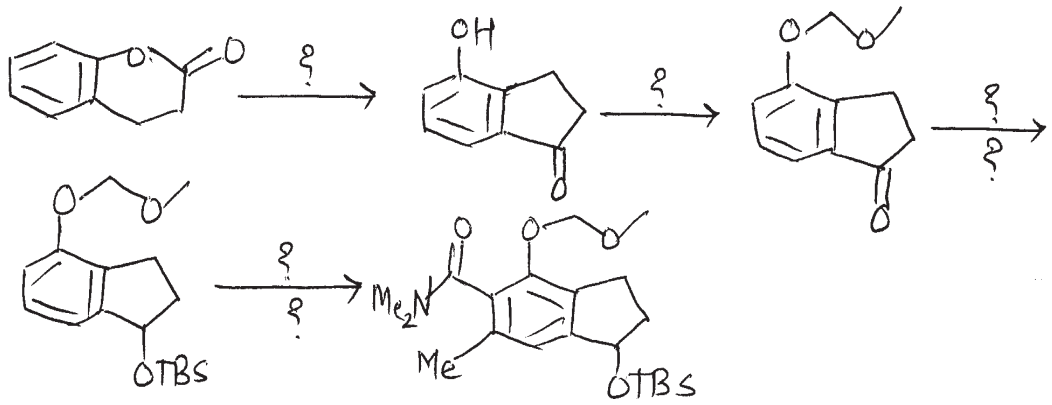
d) 

e) 

f) 

Q6) Answer any two of the following. **[9]**

a) Put the missing reagents/intermediates in the following synthesis. Justify your approach.



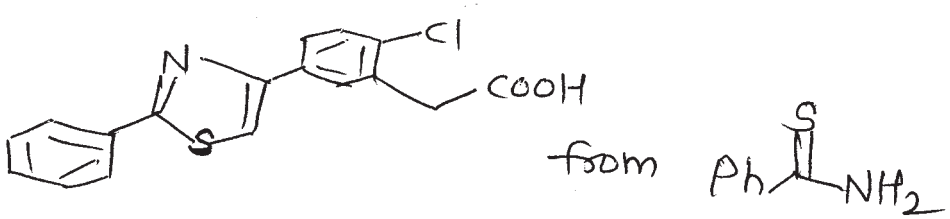
b) Explain with examples the following (any two).

i) Shapiro reaction

ii) Gabriel synthesis.

iii) Suzuki coupling.

c) Devise a synthetic pathway for the following.



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Total No. of Questions : 6]

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M.Sc.

DRUG CHEMISTRY

CH-362: Advanced Analytical Methods

(2008 Pattern) (Semester - III)

Time : 3 Hours] ***[Max. Marks : 80***

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) Explain any four of the following: **[12]**

a) Butanone and butanal can be distinguished by mass spectrometry.

b) 2-Nitrobutane shows a non-equivalence of methylene protons.

c) N, N-Dimethyl formamide shows two signals for methyl groups at room temperatures whereas only one signal due to methyl group is observed at 130°C.

d) Quaternary carbons in 13_C NMR shows weak intensity signals.

e) In furan the α-H appears at δ 7.40 and the β-H at 6.3 while in pyrrole the α -H appears at δ 6.62 and β-H at 6.05.

Q2) Deduce the structure of any four of the following: **[16]**

a) MF : $C_5H_4O_2$

IR : 28000, 27000, 1680 cm^{-1}

PMR: 6.63 dd, J = 5 & 2 Hz, 4 mm

7.28 d, J = 5 Hz, 4 mm;

7.72 d, J = 2 Hz, 4 mm; 9.67 s, 4 mm.

P.T.O.

b) M.F : $C_7H_{14}O_2$

CMR: 22.2 (q, strong), 27.7 (d), 32.2 (t),
33.8 (t), 51.4 (q), 174.4 (s)

PMR: 0.90 d, J = 7.5 Hz, 6H
1.55 m, (dt), J = 7.5 & 7.7 Hz, 2H
2.30 t, J = 7.7 Hz, 2H
3.67, s, 3H

c) MF : $C_{11}H_{11}NO_2$

IR : 1707 cm^{-1}

Mass: 189, 107, 91, 55

PMR: 7.3 d, 8 Hz, 2H
7.1 d, 8 Hz, 2H
2.8 s, 4H
2.4 s, 3H

CMR: 176 (s), 139 (s), 130 (d, str.), 129(s),
126 (d, str.). 30 (t, str.), 22 (q)

d) M.F : $C_7H_{10}O_3$

IR : 1800, 1765 cm^{-1}

Mass: 142, 70, 56

CMR: 172(s), 168(s), 38(s), 30(t),
28(t), 25 (q, str.)

PMR: 2.8 (t, 7Hz, 2H);
1.8 (t, 7Hz, 2H)
1.3 (s, 6H)

e) MF : $C_6H_{13}BrO_2$

IR : 1120, 1060 cm^{-1}

PMR: 1.3 t, J = 7 Hz, 36 mm
3.3 d, J = 6.0 Hz, 12 mm
3.55 q, J = 7 Hz, 24 mm
4.7 t, J = 6 Hz, 6 mm

Q3) Write short notes on any three: **[12]**

a) AB and AX spin systems.

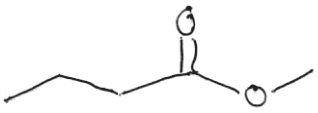
b) Factors affecting vicinal coupling constant.

c) Spin decoupling.

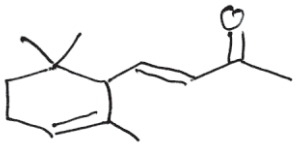
d) 2D cosy.

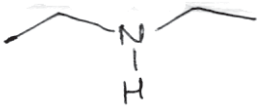
SECTION-II

Q4) a) Write genesis of any three of the following: **[9]**

i)  102, 74, 71, 59, 43, 31

ii) 1 - bromohexane 166, 164, 135, 107

iii)  192, 136, 121, 92

iv)  73, 72, 58, 44, 30

b) Suggest the structure for the compound based on the following data and explain the genesis of ions **[3]**

M.F : $C_9H_{10}O_2$

Mass (m/e) - 150, 108 (100%), 91, 77, 73.

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

a) Explain the terms:

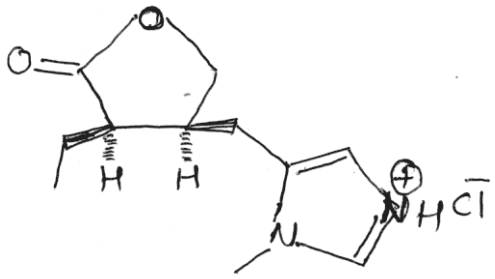
i) Reverse phase chromatography.

ii) Ion exchange chromatography.

b) Discuss in breif the theory of HPLC.

c) Discuss instrumentation and applications of GLC.

B) Assign the signals to different carbons of the following compound and explain your answer. **[4]**



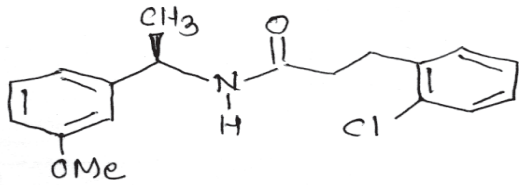
12.2 (q), 18.6 (t), 21.5 (t),

34.1 (q), 36.8 (d), 45 (d),

71.8 (t), 117.6 (d), 133.2 (d),

136.1 (d), 182.3 (s)

C) Assign the signals to protons of the compound shown below. Justify your choice. Use the NOE and the decoupling data for assignments.**[6]**



1.4 d, J = 6.9 Hz, 3H; 2.49 t, J = 7.6 Hz, 2H;

3.08 t, J = 7.6 Hz, 2H; 3.79 s, 3H;

5.07 quin. J = 7.1 Hz, 1H; 5.56 bd, J = 7.1 Hz, 1H;

6.78 dd, J = 2 & 1.1 Hz, 1H; 6.8 - 6.82 m, 2H;

7.13 - 7.15 m, 3H; 7.27 td, J = 8 & 2.1 Hz, 1H;

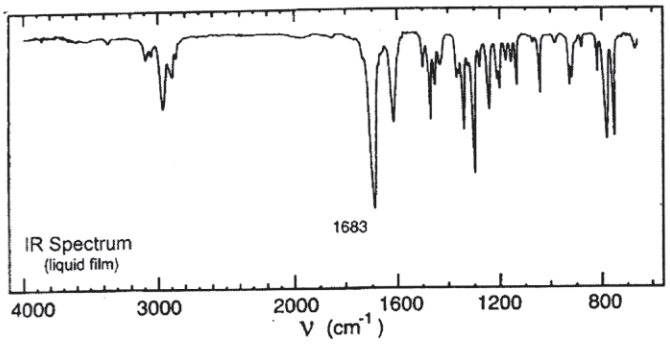
7.3 dd, J = 7.8 & 2.1 Hz, 1H

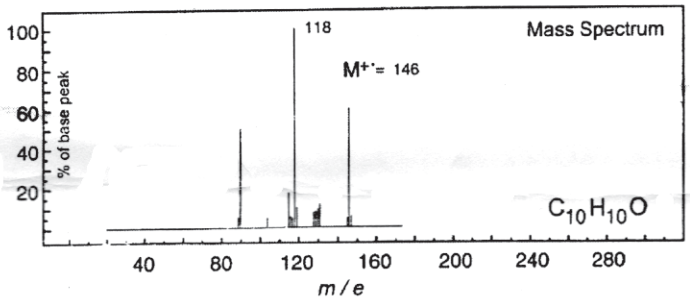
NOE Experiment	Irradiation at	Change at
	3.79	6.78 by 15%

Decoupling Experiment

Irradiation at	Change at
6.78	6.8 - 6.82 $\rightarrow$ dd, J = 8 & 2Hz
7.30	7.27 $\rightarrow$ t, J = 8 Hz
	7.13 - 7.15 $\rightarrow$ simplified.

Q6) You are provided with spectras of a compound on a next page. Analyse the spectras and deduce the structure. Justify your answer. **[12]**



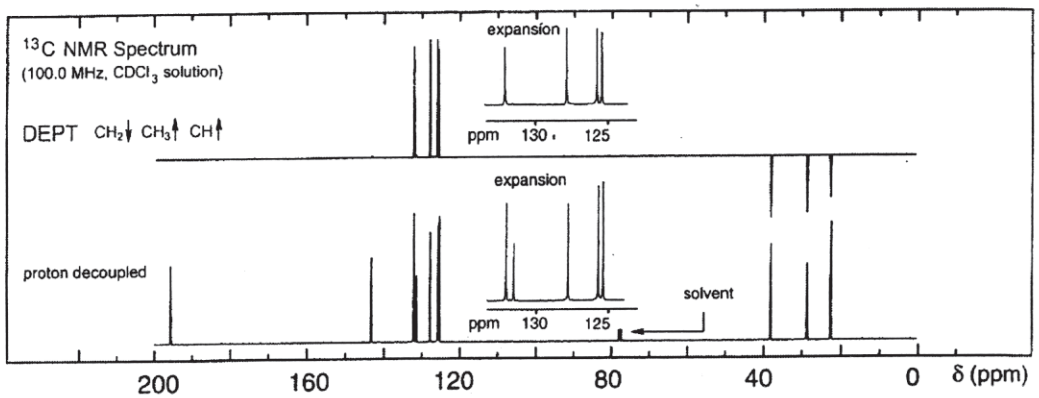


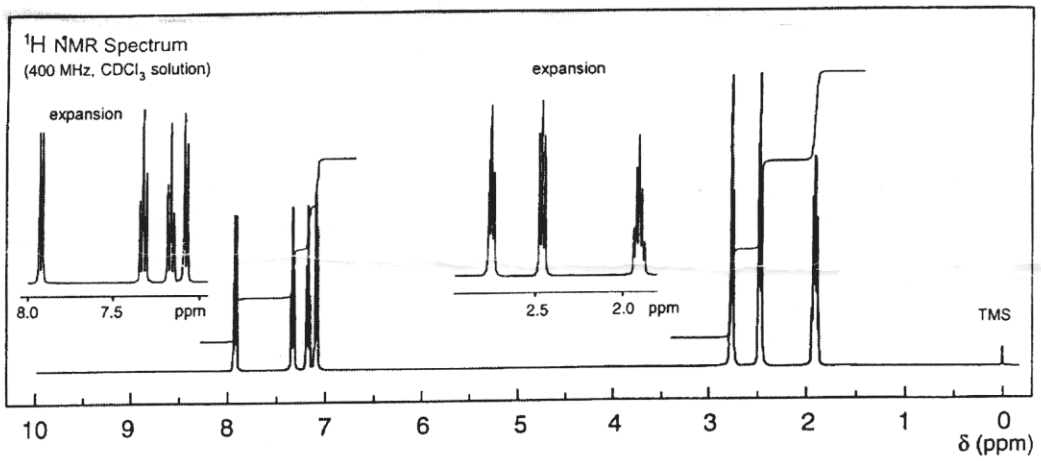
UV Spectrum

λ_{max} 249 nm ($\log_{10}\varepsilon$ 4.1)

λ_{max} 292 nm ($\log_{10}\varepsilon$ 3.3)

solvent : ethanol





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M.Sc.

DRUG CHEMISTRY

CH 363 : Drug Development Immunology and Microbiology (2008 Pattern) (Semester-III) (Credit System)

Time : 3 Hours] ***[Max. Marks : 80***

Instructions to the candidates:

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

SECTION - I

Q1) Answer any three of the following: **[15]**

a) Describe any one method for isolating bacteria.

b) Describe the structure of a typical fermentor.

c) Short note on Microbial effluent treatment.

d) Short note on Antimicrobial assay.

e) Give a brief classification of microbes.

Q2) Attempt any three of the following : **[15]**

a) What are the various barriers involved in Innate immunity. Describe them in brief.

b) What is Hypersensitivity. Describe any one type of Hypersensitivity in brief.

c) Short note on : Auto immunity.

d) Describe ELISA or RIA as an Immunological technique.

e) Give an account of various types of Adaptive Immunity.

P.T.O.

Q3) Answer <u>any two</u> of the following : **[10]**

a) Discuss in brief the various sources of drugs. How are drug molecules obtained from these sources?

b) Give a brief account of the Function performed by the following in a pharma industry.

i) R & D

ii) Industrial Hygiene and safety.

c) Explain the different routes of drug administration with examples.

SECTION - II

Q4) Answer <u>any three</u> of the following : **[18]**

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

b) Define clinical trials. Explain all the phases involved in planning and observations done in clinical trials.

c) Explain the following :

i) State of the art

ii) Claim

ii) patent

d) Explain how the screening of lead compounds has been carried out from the following.

i) Medical Folklore

ii) synthetic Libraries.

Q5) Answer <u>any two</u> of the following : **[12]**

a) Discuss the following :

i) Dose - ranging studies

ii) Reproductive studies

b) Define dosage forms. Discuss the semisolid dosage forms with proper example.

c) Discuss the following :

i) Lead development

ii) FDA.

Q6) Answer <u>any two</u> of the following : **[10]**

a) Discuss the different system of Medicines.

b) Enlist the objectives of Bioavailability studies.

c) Make a comment on 'Rational drug discovery with an examples'.

✠✠✠✠✠

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M.Sc.
DRUG CHEMISTRY
CH - 364 : Stereochemical Principles & Applications
(2008 Pattern) (Semester-III)

Time : 3 Hours] ***[Max. Marks : 80***

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) Attempt any four of the following: **[12]**

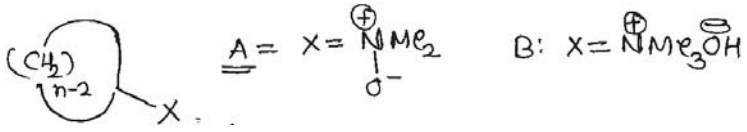
a) Chair-boat interconversion is more Facile in cyclohexanone than in cyclohexene. Explain.

b) Explain the following concept:

R = $OCOC_6H_4NO_2$-P $K_{trans} \Big|_{K_{CIS}}^{=2.5}$ R = $COOC_2H_5$

c) Explain the effect of size of incoming and outgoing groups in SN^1 and SN^2 reactions in substituted cyclohexane.

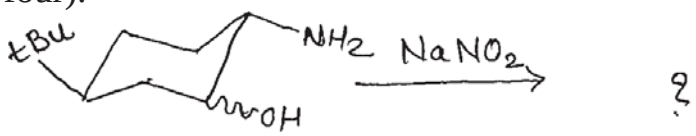
d) Pyrolysis of compounds A & B give cycloalkene as follows. For n = 7 both A & B give cis-olefin; for n = 8, A gives cis olefin while B give transolefin. For n = 9, both A & B give only trans olefin. Explain.

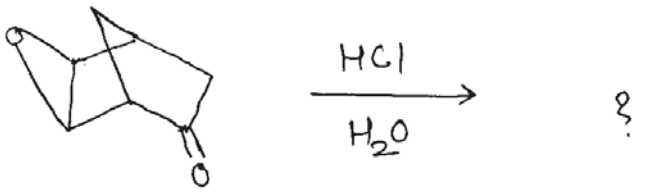


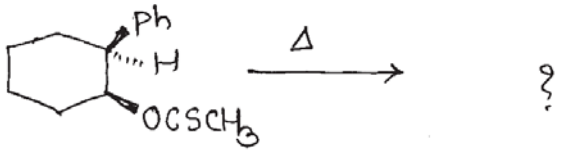
e) U.V. spectrum of higher rings of paracyclophenes resemble with 1, 4 - dialkyl benzene.

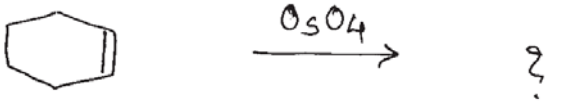
P.T.O.

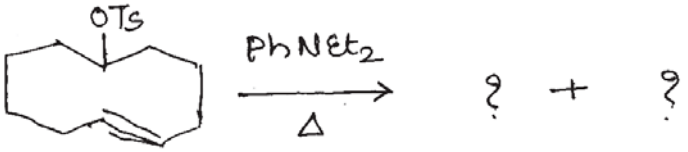
Q2) a) Predict the products and explain the stereochemical principles involved. (any four): **[12]**

i) 

ii) 

iii) 

iv) 

v) 

b) Give a short account of stereochemistry and stability of conformations of cyclohexane. **[4]**

Q3) Attempt any four of the following: **[12]**

a) Explain Bredt's rule .

b) Discuss Van Auwers-Skita rule with exceptions to this rule.

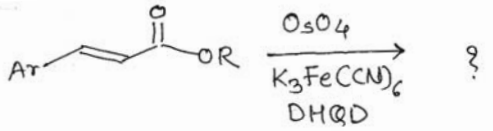
c) Write the conformations of perhydroanthracene and explain their stability.

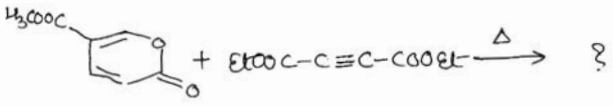
d) Give an account of conformational effects in six membered ring containing unsaturation.

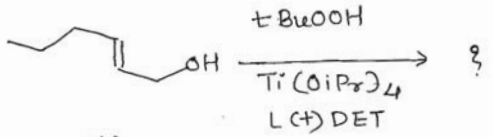
e) Discuss α - haloketo rule E with respect to change in physical properties.

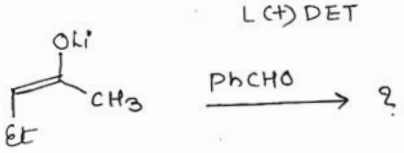
SECTION-II

Q4) a) Predict the product in any three of the following: **[6]**

i) 

ii) 

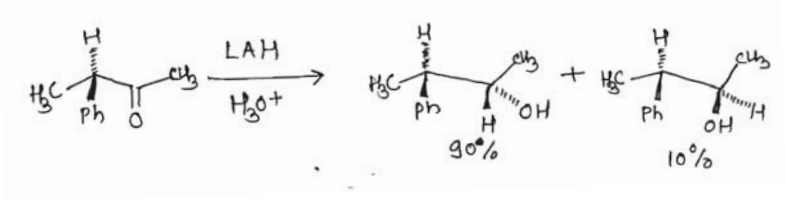
iii) 

iv) 

b) Answer the following:

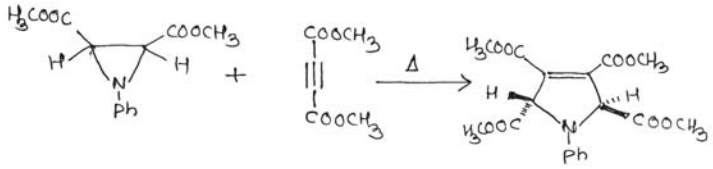
i) What is enantiomeric excess? How it is calculated. Explain with suitable example. **[3]**

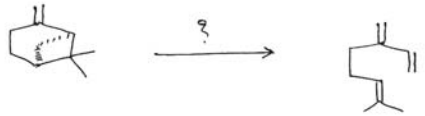
ii) Using Felkin rule explain the following transformation. **[3]**

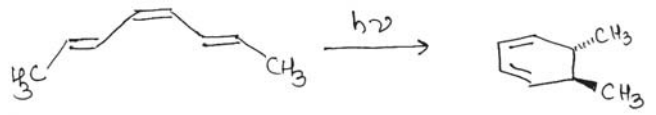


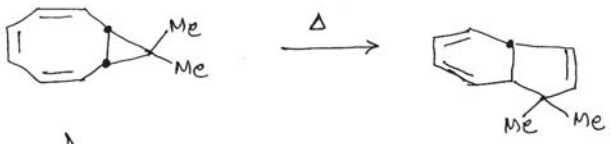
Q5) a) Draw correlation diagram for cycloaddition reaction of hexatriene to cyclohexadiene. Explain whether the reaction is thermally or photochemically allowed. **[6]**

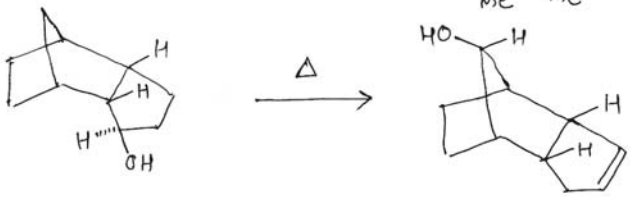
b) Suggest the mechanism. (any Five): **[10]**

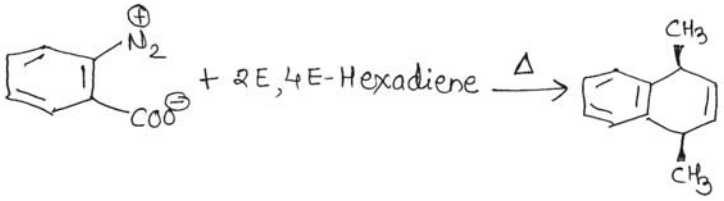
i) 

ii) 

iii) 

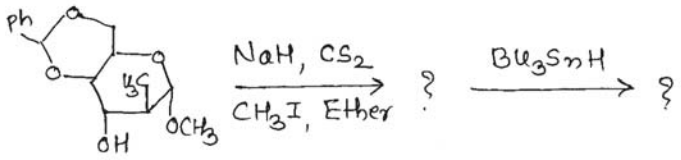
iv) 

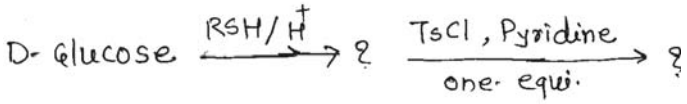
v) 

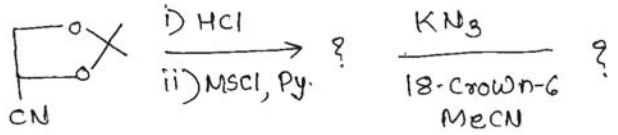
vi) 

Q6) a) Give the experimental evidence for the ring structure of glucose. Write $^4C_1$ and $^1C_4$ conformations for D-glucose. **[4]**

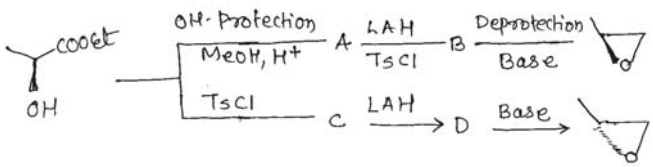
b) Predict the products. (any two): **[5]**

i) 

ii) 

iii) 

c) Complete the following reaction sequence. **[3]**



Write structures of A, B, C & D.

✈ ✈ ✈

Total No. of Questions : 6]

SEAT No. :

P1961

[Total No. of Pages : 4

[5325]-41
M.Sc.
DRUG CHEMISTRY
CH - 461 : Synthetic Methods in Organic Chemistry
(2008 Pattern) (Semester - IV)

Time : 3 Hours] *[Max. Marks : 80*

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) Explain any three of the following: **[9]**

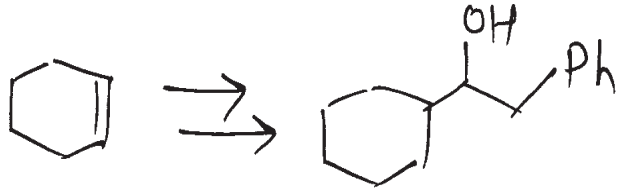
i) 2, 2′ Dibenzyl cyclohexanone cannot be synthesized in high yield from cyclohexanone using enamine approach.

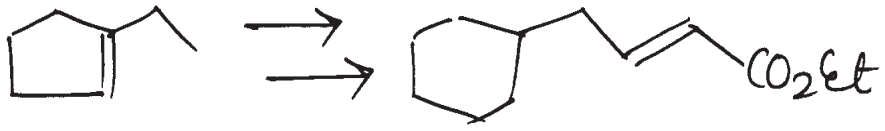
ii) Use of the method for conversion of $RCH_2Br....\rightarrow RCH_2COOH$ involves umpoulng of reactivity.

iii) Tertiarybutoxy carbonyl protection is commonly used for the protection of amino group in peptide synthesis.

iv) Heteroatom directed lithiation reactions can be used to synthesize 0-substituted benzoic acid from benzoic acid.

b) Complete the following transformation and justify your answer (any two):**[6]**

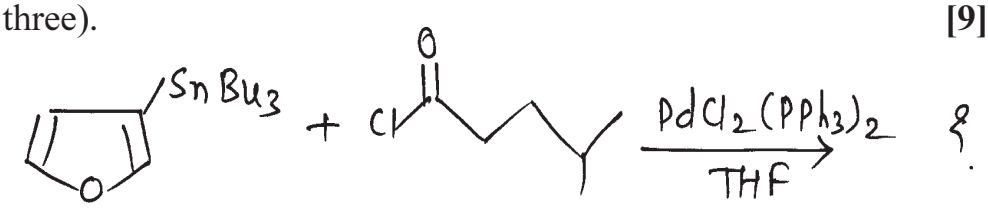
i) 

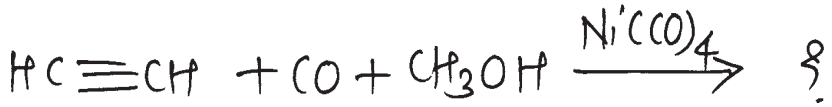
ii) 

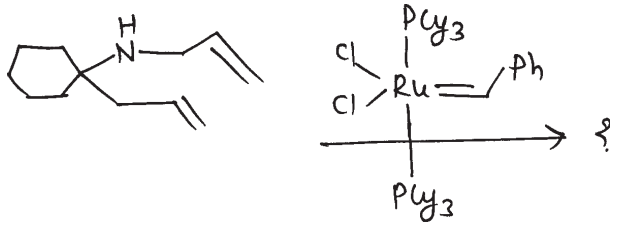
iii) 

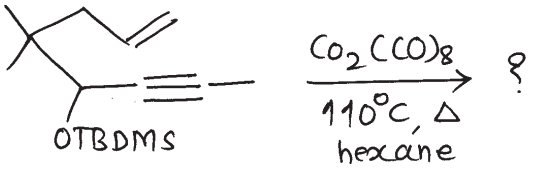
P.T.O.

Q2) a) Predict the product explaining the role of transition metal complex (any three). **[9]**

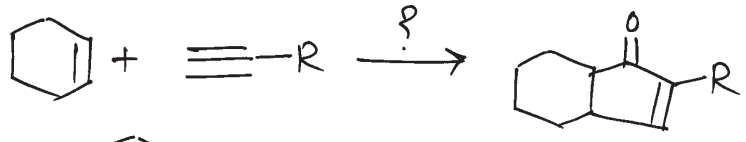
i) 

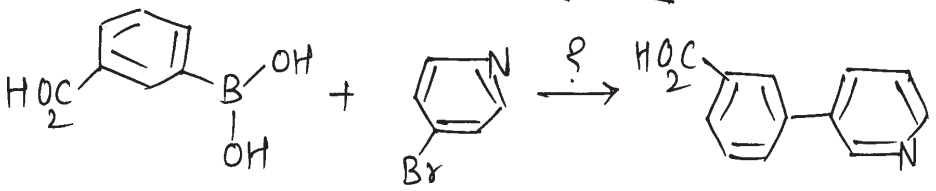
ii) 

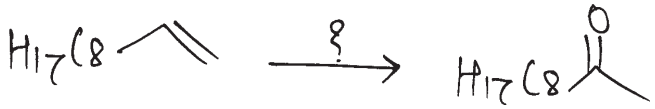
iii) 

iv) 

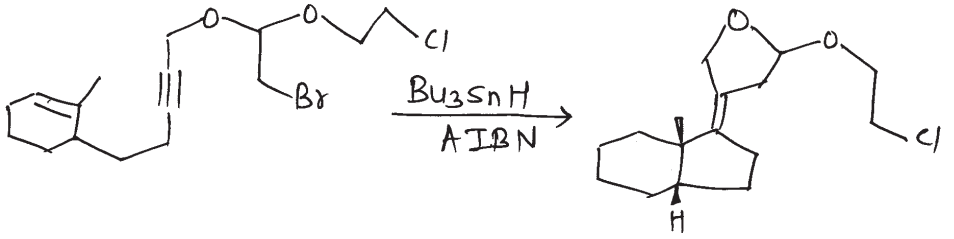
b) Predict the reagent in the following conversions (any two): **[6]**

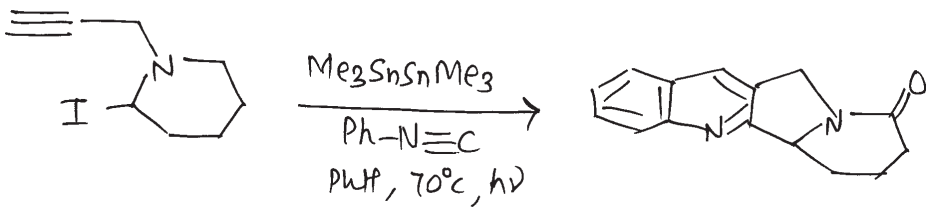
i) 

ii) 

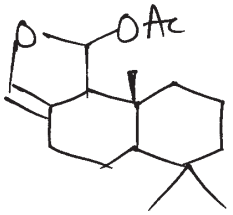
iii) 

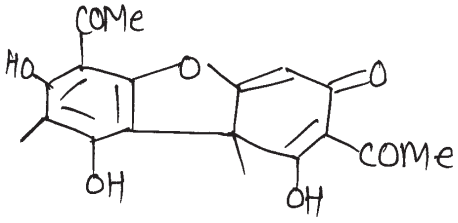
Q3) a) Explain the steps involved in any one of the following Domino reaction. **[5]**

i) 

ii) 

b) Explain biomimetic approach to the retrosynthesis of any one of the following. **[5]**

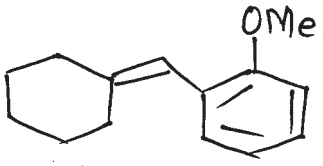
i) 

ii) 

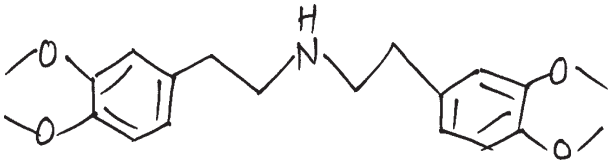
CH-461 synthetic methods in Organic Chemistry.

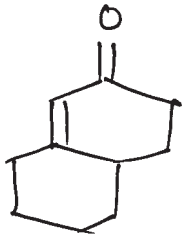
SECTION - II

Q4) Using retrosynthetic analysis, suggest a suitable method to synthesize any three of the following: **[12]**

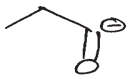
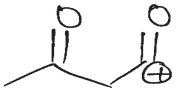
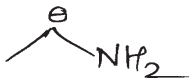
i) 

ii) 

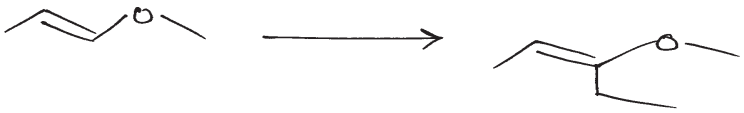
iii) 

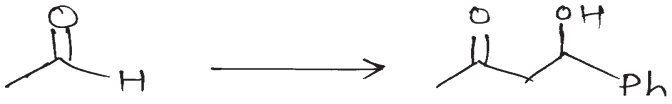
iv) 

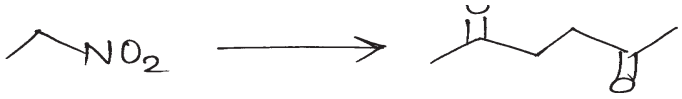
Q5) a) Give one reaction with reagents for each synthon given below. **[6]**

i)  ii)  iii) 

b) Using the method of umpolung carry out conversion of any two of the following. **[6]**

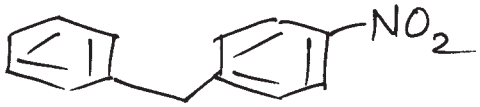
i) 

ii) 

iii) 

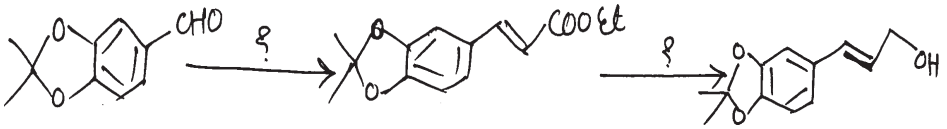
Q6) a) Answer any four of the following: **[12]**

i) Give the two methods for synthesis of the following.

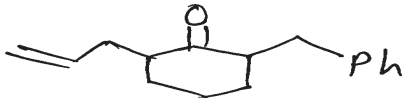


ii) Role of ionic liquids in organic synthesis.

iii) Insert the missing reagents in the following sequence of reaction.



iv) Synthesize the following compound by examine approach from cyclohexanone.



v) Discuss the OXO process in organic synthesis.

b) Attempt any one of the following: **[4]**

i) Use of sulphur compounds in Umpolung synthesis.

ii) Atom economy in Green Chemistry.

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Total No. of Questions : 6]

SEAT No : ____

P 1962

[Total No. of Pages :2

[5325]-42
M.Sc.
DRUG CHEMISTRY
CH - 462 : Chemotherapy
(2008 Pattern) (Semester-IV)

Time : 3 Hours] ***[Max. Marks : 80***

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: **[15]**

a) What are drugs? How do they show their effect? Discuss in brief the common strategies applied to discover drugs.

b) Disucss the steps in protein biosynthesis. Give a commentary on protein synthesis inhibitors.

c) Give a brief account on Quinolone antibiotics.

d) Explain folate pathway. How do sulfonamides & trimethoprim exhibit their effect?

Q2) Answer any two of the following: **[16]**

a) Explain viral life cycle. What are common viral infections? Comment how Acyclovir & AZT exhibit antiviral activity.

b) Explain discovery & development of alkylating agents, their mechanism. Also explain role of natural products in cancer treatment.

c) Explain epilepsy & convulsion in brief. Explain the use & mechanism of Barbiturates & benzodiazepins.

Q3) Discuss in brief any three of the following: **[9]**

a) Selective toxicity .

b) DNA intercalators.

c) Prodrug approach.

d) Hyperacidity.

P.T.O.

SECTION-II

Q4) Answer any three of the following questions: **[18]**

a) Discuss the organization & functioning of the Endocrine system. Explain how endocrine therapy could be effectively used to treat hormone dependent cancers.

b) Explain the following terms & their treatment.

i) Ulcers ii) Constipation

iii) Stroke iv) Hypertension

c) Describe the function of pancreas, role of α & β cells. Explain the difference between NIDDM & IDDM & management of NIDDM.

d) What is pain? Explain the pathway & mechanism of action of common analgesics?

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

a) Discuss the role & MOA of following (any 2):

i) B - blockers

ii) Topoisomerase inhibitors

iii) Vasodilators

b) Explain Tuberculosis, its symptoms, diagnosis, treatment.

c) Explain how diuretics & thrombolytics help in managing CVS disorders.

Q6) Discuss mode of action and used of any four: **[12]**

a) Roxithromycin.

b) 5 - fluorouracil.

c) Insulin

d) Doxorubicin.

e) Valproic acid.

f) Omeprazole.

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Total No. of Questions : 6]

SEAT No : ____

P 1963

[Total No. of Pages :2

[5325]-43
M.Sc.
DRUG CHEMISTRY
CH - 463 : Drug Design
(2008 Pattern) (Semester-IV)

Time : 3 Hours] ***[Max. Marks : 80***

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 two of the following: **[14]**

a) Discuss briefly any two of the following:

i) Subunit vaccines.

ii) Therapeutic enzyme production by RDT.

iii) Use of peptide nucleic acid as antisense molecule.

b) What is gene therapy? How someone suffering from SCID is treated by gene therapy.

c) What enzymes are used in r-DNA preparation. Explain in details the use of any two of these in the process.

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

a) Define arithmatic mean and standard deviation. Compute standard deviation for the data given below.

Heights of plants in inches:- 12.5, 13.8, 14.2, 12.9, 13.4

b) A packaging machine is designed for making packets of 200 gms of milk powder. Test whether the machine is working properly or not at 5% level of significance by taking sample 200, 199, 198, 201, 194, 198, 199, 193 (t_7, 0.05 = 2.365).

c) Define correlation, state the different types. Compute Karl Pearson's coefficient of correlation between age (in years) and blood pressure in (mm/Hg) for seven individuals.

Age	48	50	58	62	65	70	72
B.P.	120	118	122	123	125	126	128

P.T.O.

Q3) Answer any two of the following: **[14]**

a) Discuss the functions of membrane bound receptors and Ion-channels. Explain the mechanism.

b) What is the need for prodrug design. Explain with suitable examples, the benifits of prodrugs over routine drugs.

c) Discuss in brief solid phase synthesis. How is the technique applied to synthesize combinatorial libraries. Explain its use in drug discovery.

SECTION-II

Q4) Answer any three of the following: **[18]**

a) Explain:

i) Molecular Dynamics simulation.

ii) Ab initio methods

b) Explain how the following are calculated/determined for a QSAR analysis.

c) Define the term, 'Energy Minimisation'. Explain how this technique is central in many 'Drug Design' technologies.

d) Explain the shortcomings and benifits of:

i) Quantum Mechanics

ii) Molecular Mechanics in CADD

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

a) Explain in detail the concept of structure based drug design. Describe the steps involved and applications.

b) You are appointed on a programme for designing novel AIDS drugs. Discuss your strategies towards the problem. Justify your answer.

c) Give a brief account of 'Topliss' decision tree & Batchwise approach used in QSAR. What benifits it has over the Hansch approach?

Q6) Discuss the following in brief (any two): **[10]**

a) Bioinformatics in Drug Discovery.

b) Montecarlo Approach.

c) Signalling mechanism for Tyrosine kinase Family.

d) Parallel synthesis.

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