Total No. of Questions : 6]

SEAT No. :

P2807

[Total No. of Pages : 5

[5025]-31

M.Sc. (Semester - III)

DRUG CHEMISTRY

CH-361 : Chemistry of Heterocycles and Biologically Active Compounds

(2008 Pattern)

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

a) Pyridine-N-Oxide undergoes very facile electrophilic as well as nucleophilic substitution.

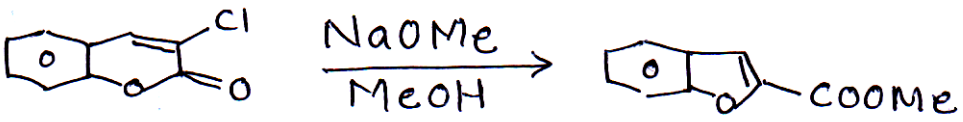
b) Thiophene undergoes nitration at 2-position while nitration of benzothiophene mainly occurs at C-3 position.

c) Oxazole is less basic than imidazole.

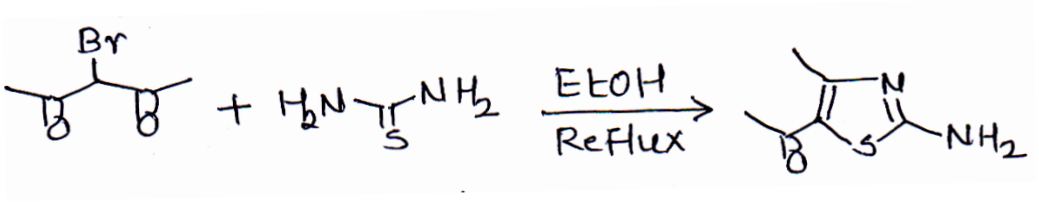
d) Reaction of 2, 4-dichloropyrimidine with NaoMe in MeOH gives 4-substituted product.

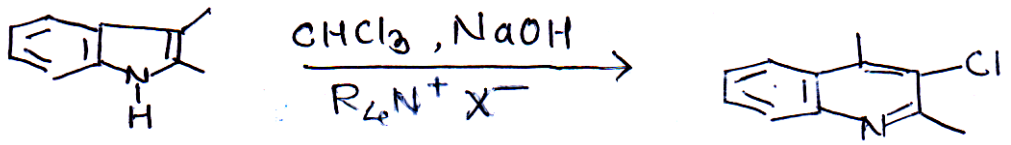
e) 5-Methoxy quinoline can't be synthesized easily using skraup method.

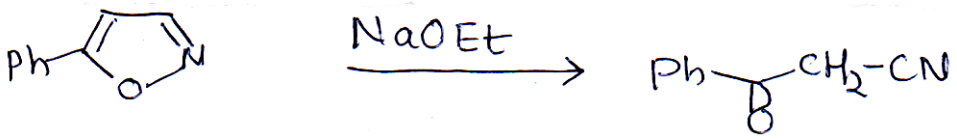
Q2) Suggest the suitable mechanism for any four of the following conversions. **[12]**

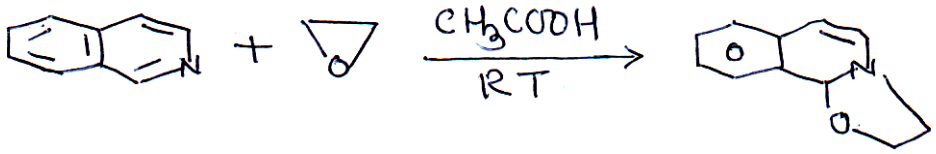
a) 

P.T.O.

b) 

c) 

d) 

e) 

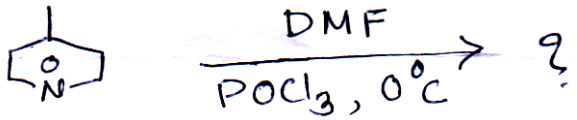
Q3) a) Write short notes on any two of the following : **[7]**

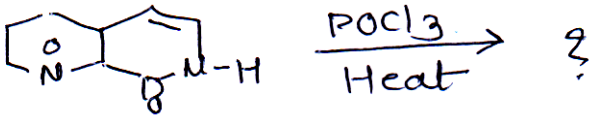
i) Fiest-Benary synthesis

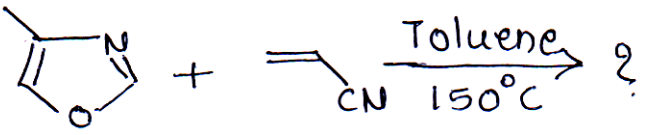
ii) Knorr pyrrole synthesis

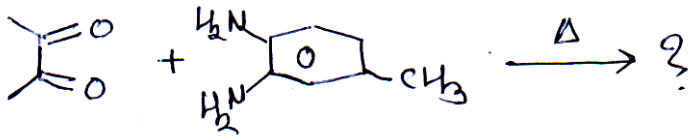
iii) Hantzsch pyridine synthesis

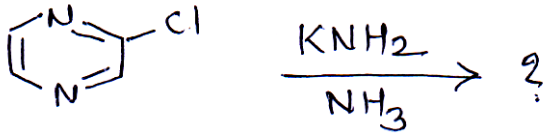
b) Predict the products with mechanism forany three of the following : **[9]**

i) 

ii) 

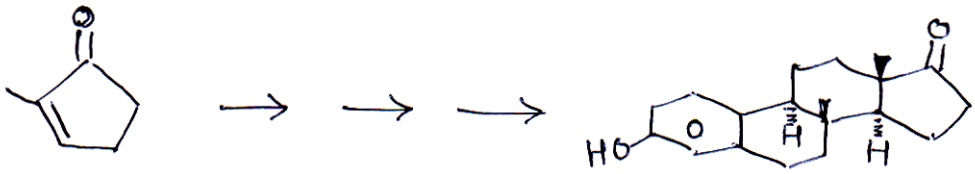
iii) 

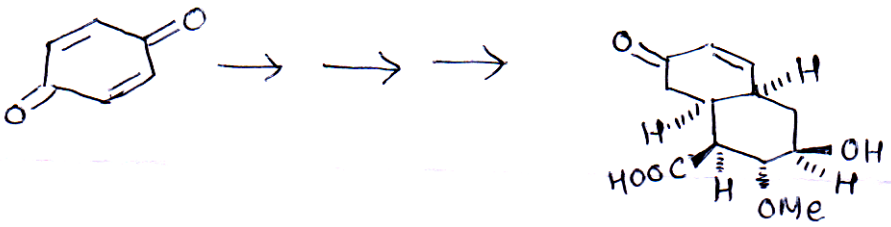
iv) 

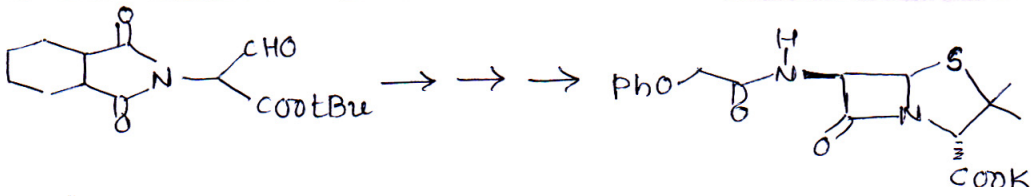
v) 

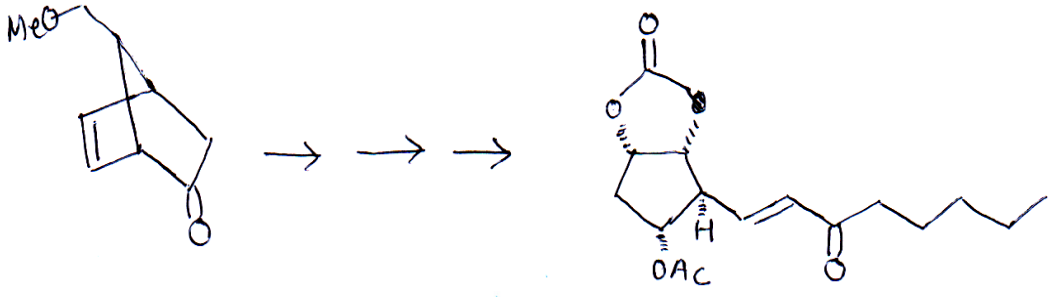
SECTION - II

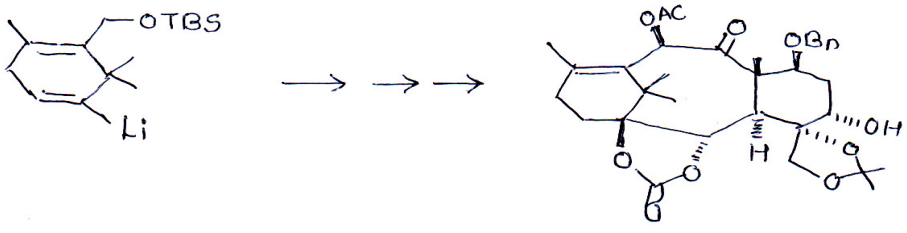
Q4) Discuss the steps involved in the following transformations. Comment on the steps indicating mechanism and reagents used (any three) : **[15]**

a) 

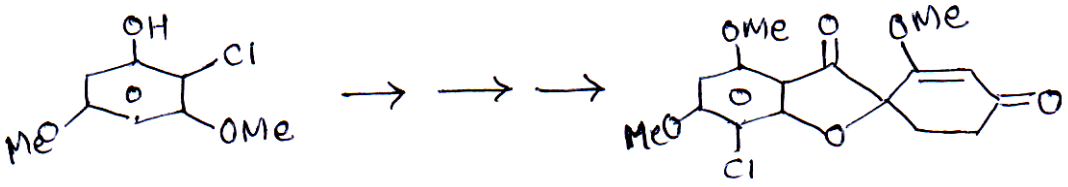
b) 

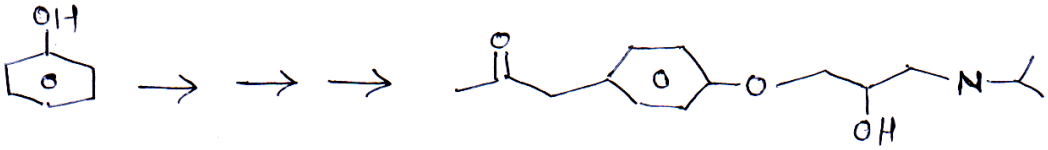
c) 

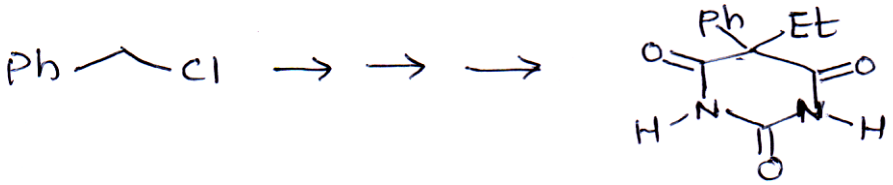
d) 

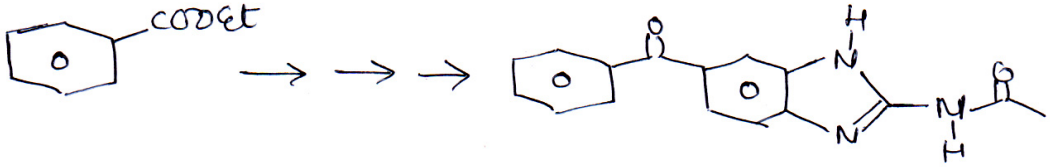
e) 

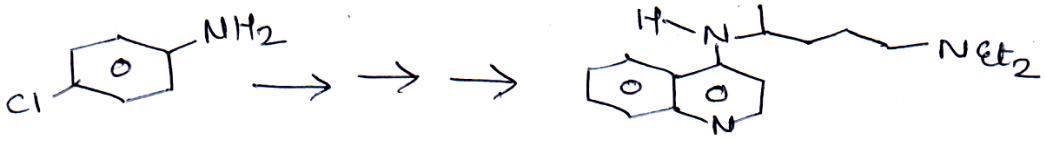
Q5) Discuss the steps involved in the synthesis of following drug molecules. Explain the mechanism involved (any four) : **[16]**

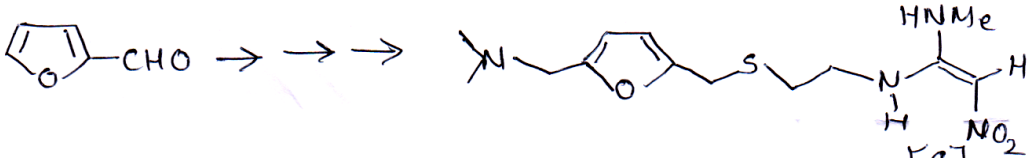
a) 

b) 

c) 

d) 

e) 

f) 

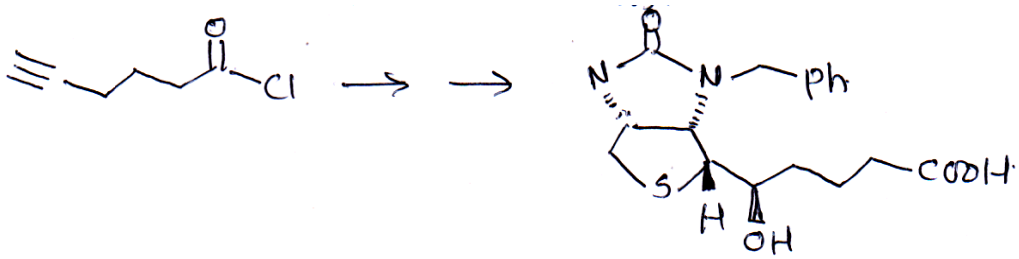
Q6) Answer any three of the following : **[9]**

a) Explain the following

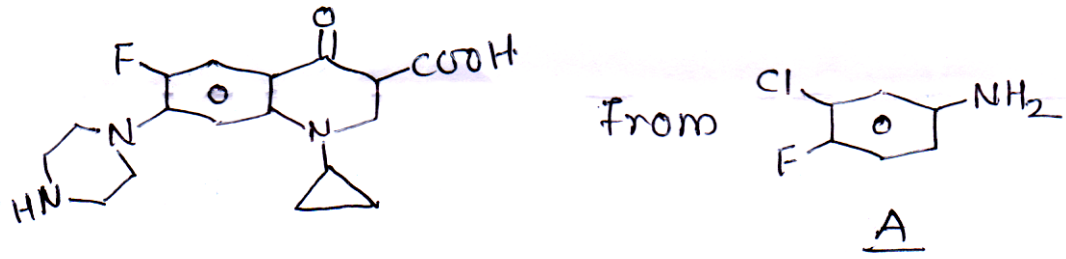
i) Shapiro Reaction

ii) Macrolactonisation

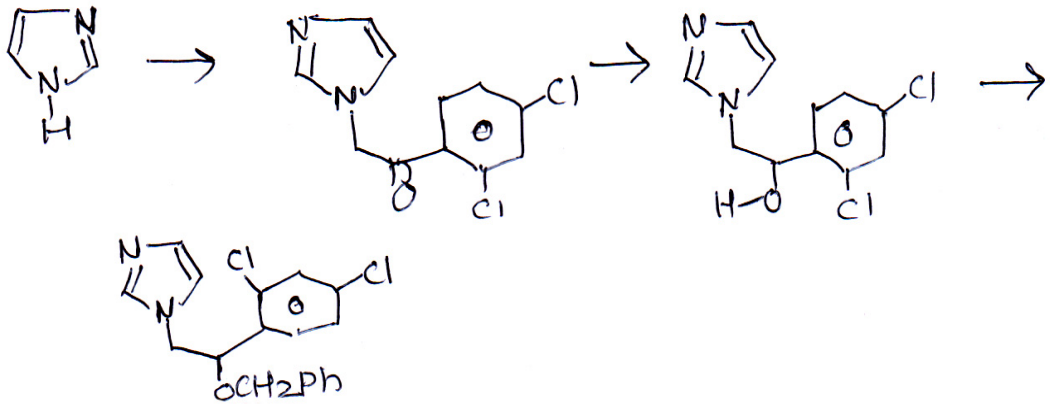
b) Devise a synthetic pathway for the following conversion. Explain the mechanism involved.



c) Do the reterosynthesis of ciprofloxacin and device a synthetic pathway starting from A



d) Identify the missing reagents and explain the following transformation.



Total No. of Questions : 5]

SEAT No. :

P2808

[Total No. of Pages : 5

[5025]-32

M.Sc.

DRUG CHEMISTRY

CH-362 : Advanced Analytical Methods

(2008 Pattern)

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.*

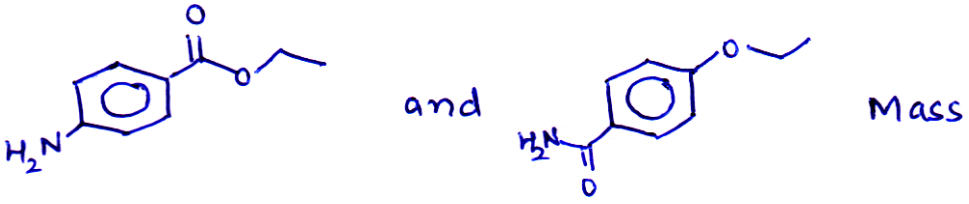
SECTION - I

Q1) Answer any four of the following : **[12]**

a) DEPT is better technique than APT or off-resonance for assignment in CMR. Explain.

b) NMR can be used as a tool to distinguish primary secondary and tertiary alcohols.

c) Differentiate the following pairs by the indicated spectral method.

i) 

ii) 

d) Mass spectrometry can be used to determine the number of chlorine and bromine atoms in organic compounds. Explain.

P.T.O.

e) The 'H NMR spectrum of 1, 3-Dioxane contains three multiplets with the following geminal couplings –6.1, –11.2 and –12.9 Hz. Assign these resonances.

Q2) Answer <u>any four</u> of the following : **[16]**

a) Deduce the structure

M.F. : $C_7 H_{14} O_2$

Mass (m/e) : 130, 115, 100, 73, 43

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

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

b) Predict the structure

M.F. : $C_5 H_{10} O_3$

IR : 1728 cm^{-1}

PMR : 2.1 (s, 3H), 3.35(s, 6H), 4.6 (s, 1H)

CMR : 25, 55, 104, 204

DEPT 90 : 25, 55, 204, No Peak
104 up

DEPT 135 : 204 no peak

25, 55, 104 up

c) Deduce the structure from the following data

M.F. : $C_5H_9NO_4$

IR : 1642 cm^{-1}

Mass : 147, 102, 84

PMR : 2.3 (m, 2H), 2.7 (m, 2H), 4.1 (t, 7Hz, 1H) 4H exchangeable

CMR & DEPT 135 : 25(down), 30(down), 55(up), 174(absent), 178 (absent)

d) Deduce the structure

M.F. : $C_{10}H_{15}N$

CMR : 10.2(q) 20.1(q) 29.6(t) 49.7(d) 113(d, str.) 116(d) 129(d,str.) 148(s)

e) An eight carbon compound shows following spectral data find the structure and assign the signals.

UV : $199(\in = 19200), 245(\in = 10,900)$

IR : 1690, 1600, 690cm^{-1}

PMR : 4.6(s, 11mm), 7.5(m, 17mm) 7.9(dd, 8 & 2Hz, 11mm)

Mass : 156, 154, 106, 105 (100%), 91, 77

Q3) Write short notes on <u>any three</u> of the following : **[12]**

a) Application of HETCOR, COSY.

b) Ionization techniques in mass spectrometry

c) Factors affecting ^{13}C chemical shifts

d) AB and AX spin system in PMR

SECTION - II

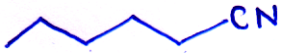
Q4) a) Answer <u>any two</u> of the following : **[8]**

i) Discuss the various parts of GCMS.

ii) Explain the theory and instrumentation of HPTLC.

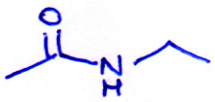
iii) Draw schematic diagram of HPLC and give its applications.

b) Explain the genesis of the following ions (any three) : **[9]**

i) 

97, 82, 68, 41

ii) 2-Nitro aniline 138, 121, 92, 80, 65

iii) 

87,72,43,30

iv) 

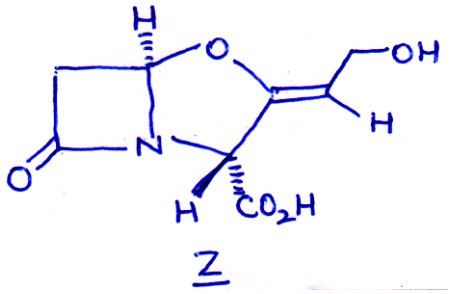
74, 58, 31

c) Two isomeric methyl ethers with M.F. $C_5H_{12}O$ having following M.S. Identify the two isomers. **[3]**

X : 88, 56, 45 (100), 41, 29, 27

Y : 73, 59 (100), 45, 41, 29

Q5) a) Compound Z shows following signals. Assign signals to different protons using decoupling experiments given below. Justify your answer. **[8]**



Z

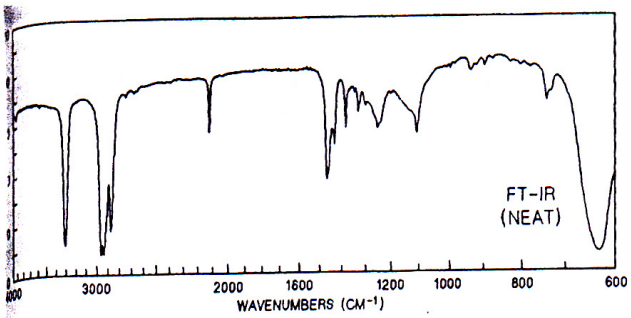
3.05 (d, 18Hz, 1H), 3.6 (dd, 18 & 2.5Hz, 1H), 4.75 (d, 7.5Hz, 2H), 4.95 (bs, exch., 1H), 5.66(s, 1H), 5.78(t, 7.5Hz, 1H), 6.0 (d, 2.5Hz, 1H) 11.3(s,1H)

Decoupling Expt.

i) Irradiation of 6.0δ change 3.6 to a doublet J = 18Hz

ii) NOE : Irradiation of 4.75δ increases the intensity of 5.78 by 20%.

b) Your are provided the spectra of unknown compound on the adjacent page. Analyze the spectra and arrive at a suitable structure. Justify your answer. **[12]**



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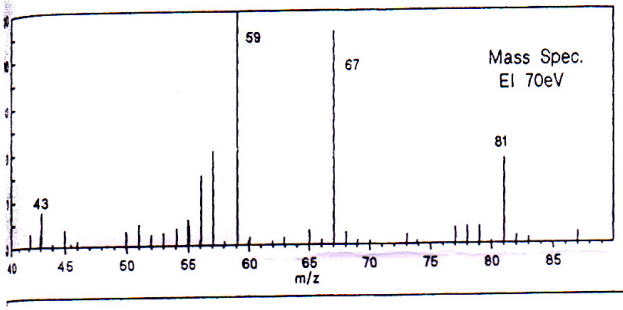
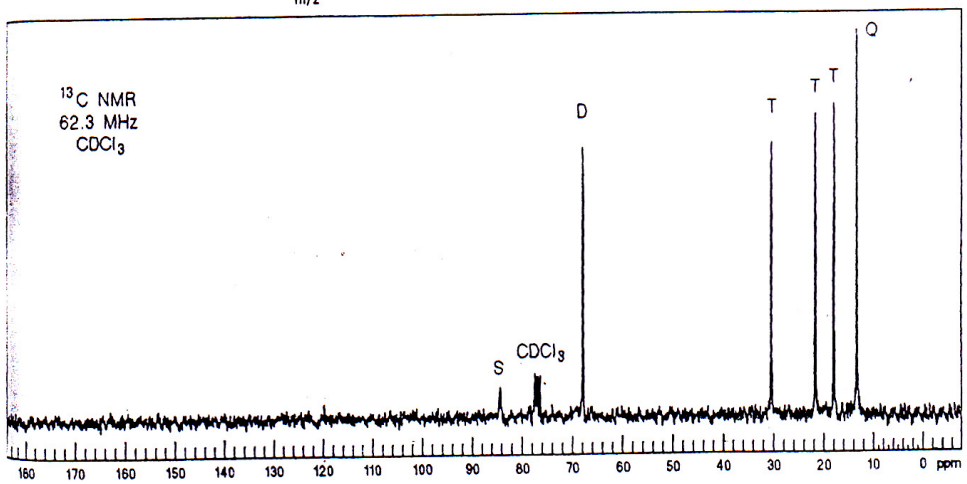
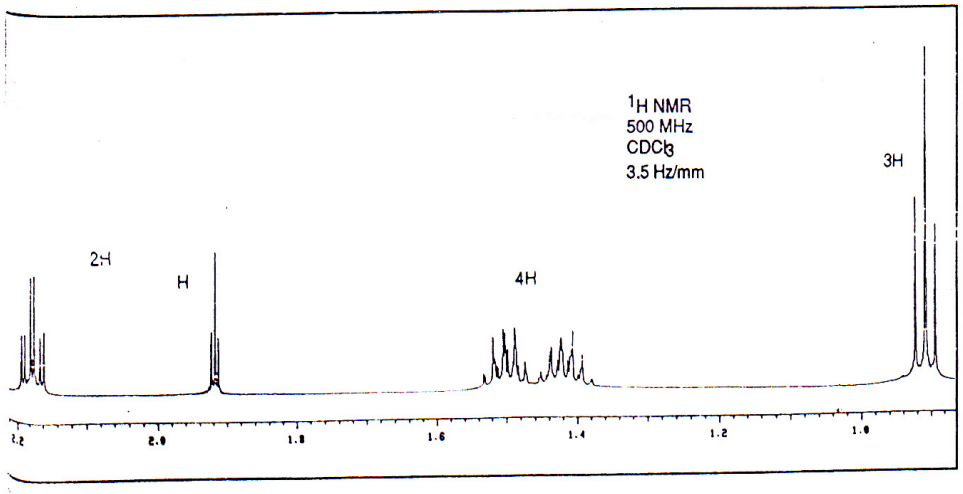
UVλ_{max} = 220 (ε = 120,000)







Total No. of Questions : 6]

SEAT No. :

P2809

[Total No. of Pages : 3

[5025]-33

M.Sc.

DRUG CHEMISTRY

CH-363 : Drug Development

(2008 Pattern)

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

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 the right indicate maximum marks.***

SECTION - I

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

a) Describe a typical bacterial growth curve.

b) Describe any one method is isolate a antibiotic producing micro organism.

c) Explain the down stream process in fermentation.

d) Discuss

i) Media design

ii) Industrial strain

e) Discuss the chemical microtrial process of effluent treatment.

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

a) What is the role of B cells & T cells in immune response.

b) What are the techniques to study antigen antibody reaction. Explain one of them in brief.

c) Explain Type I or Type II hyper sensitivity in brief.

d) Discuss the organisation of the immune system.

e) Explain

i) Adaptive Immunity

ii) Vaccines

P.T.O.

Q3) Answer any two of the following : **[10]**

a) What are drugs? How do they exhibit their therapeutic effect?

b) How are drugs discovered? Explain.

c) Expalin

i) ED50

ii) MIC

iii) Therapeutic index

iv) Potency & efficacy

v) Allergy

SECTION - II

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

a) Explain the pharmacokinetics of drug action. Discuss bioavailiability.

b) You are given the job of discovering a new antibacterial drug from soil sample. How will you plan your project.

c) What are the various routes of drug administration. How is a particular route decided/chosen?

d) Explain with examples

i) lead discovery

ii) lead development

e) What are the steps involved in grant of a patent? Explain

i) Invention

ii) Claims

iii) Specification in a patent

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

a) Explain in brief the toxicological evaluation of NCE.

b) What is the need for clinical trials? What are the objectives of phase I, II & III? Discuss.

c) How is the biological activity of drugs tested. Explain in brief.

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

a) What is the role of QA, QC & R&D in pharma industry.

b) Give a brief account of drug metabolism.

c) Discuss

i) Drug targets

ii) Role of FDA

Total No. of Questions : 6]

SEAT No. :

P2810

[Total No. of Pages : 5

[5025]-34

M.Sc. (Semester - III)

DRUG CHEMISTRY

CH-364 : Stereo Chemical Principles & Applications

(2008 Pattern)

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 seperate answer books.*

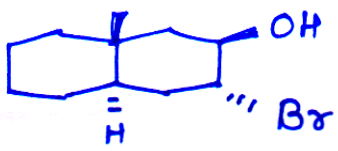
SECTION - I

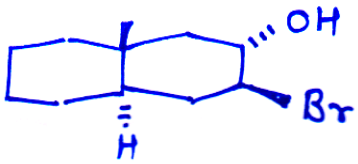
Q1) Answer any four of the following : **[16]**

a) Why Cis 1, 2 dibromocycloherane undergo elimination to furnish cyclohexene with KI in methanol at the rate 11 times slower than trans isomer.

b) Bromocamphor fails to undergo dehydro bromination on treatment with base.

c) Explain which of the following compound form an oxide on treatment with base.



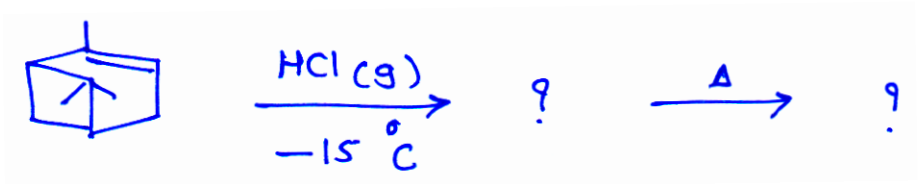


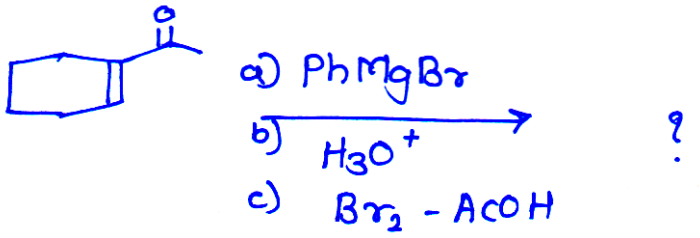
d) Camphor on LAH reduction mainly give isoborneol.

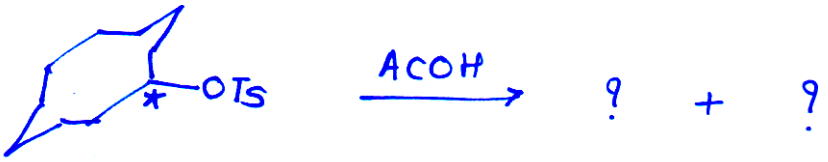
e) In 3 & 4 membered rings $Sp^2 \rightarrow Sp^3$ is facile process whereas in 5-membered rings $Sp^3 \rightarrow Sp^2$ is facile process.

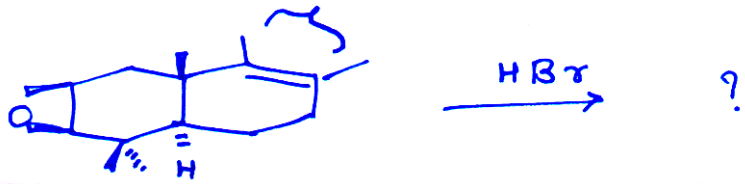
P.T.O.

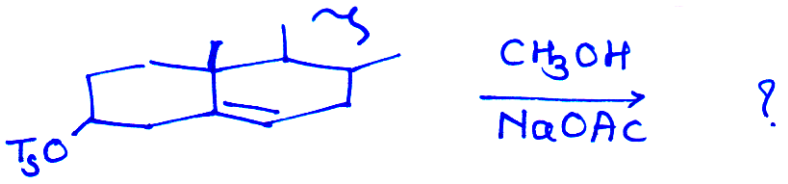
Q2) Predict the product/s. Explain the mechanism & stereochemical principles involved (any four) : **[12]**

a) 

b) 

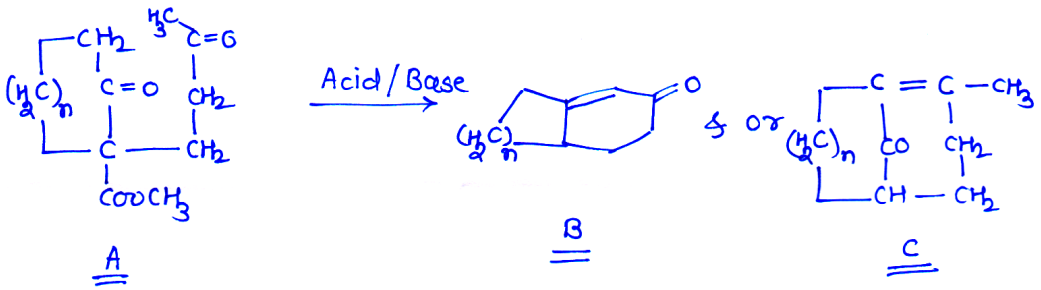
c) 

d) 

e) 

Q3) a) Answer the following : **[4]**

Compound A with acid or base? Furnish either fused ring B or bridged ring sy. C or both depending on the ring size. Explain.



	B	C
n = 4	65%	-
n = 5	32%	14%
n = 6	-	76%

b) Explain any two : **[8]**

i) Stability & stereochemistry of bicyclo [3, 3, 1] Nonane and Adamentane.

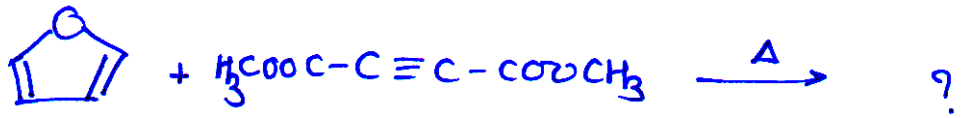
ii) Draw the stereo structures of perhydro phenanthrene and write their nomenclature.

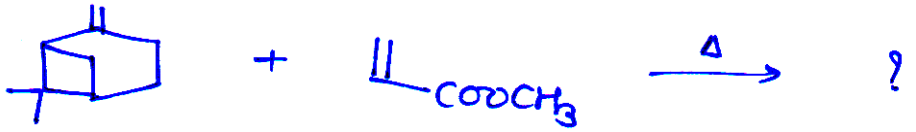
iii) 3 - alkyl ketone effect

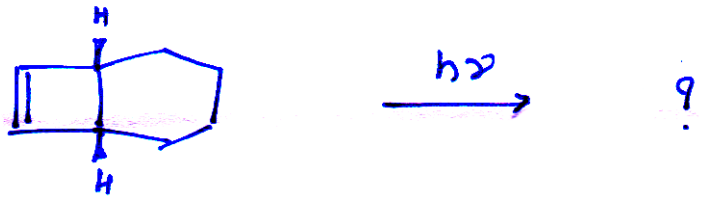
SECTION - II

Q4) a) Draw co-relation diagram for cycloaddition between 1, 3 butadiene and ethylene. Check whether it is allowed thermally or photochemically. **[6]**

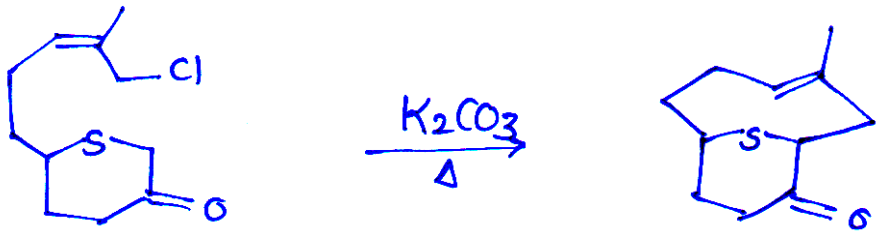
b) Predict the product/s of the following reaction with stereochemistry. (any two) : **[4]**

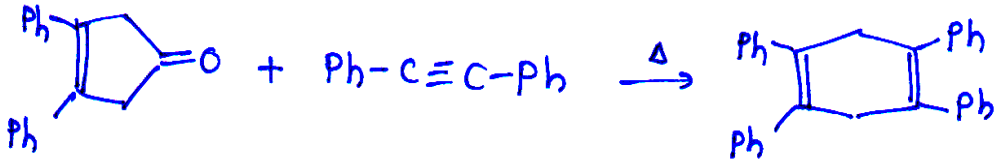
i) 

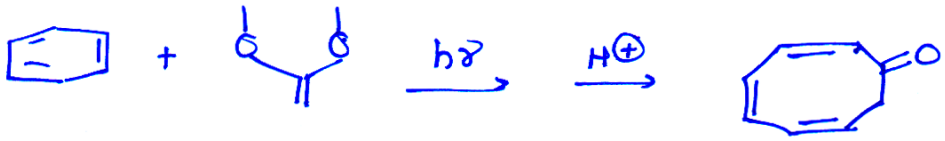
ii) 

iii) 

c) Suggest stereochemical mode of reaction with proper mechanism (any two) : **[6]**

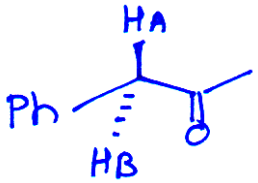
i) 

ii) 

iii) 

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

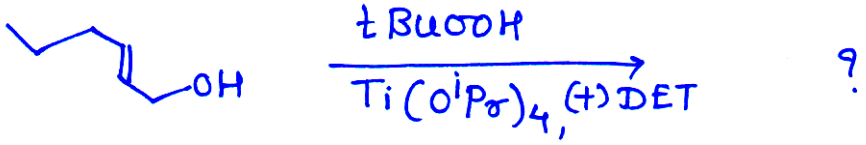
i) Write Pro R & Pro S for H_A & H_B in the following compound.



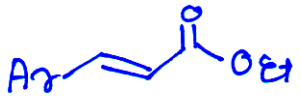
ii) Explain the Felkin's model with suitable example.

iii) Explain the term Homotopic & diastereotopic ligands.

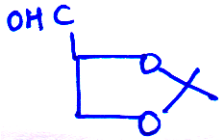
b) Predict the product/s in the following (any 3) : **[6]**

i) 

ii) 

iii) 

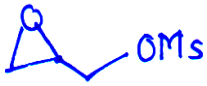
OsO_4, $K_3Fe(CN)_6$ / DHQD ligand → ?

iv) 

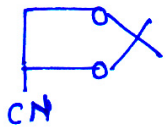
i) CH_3MgI, ether
ii) CrO_3, acetone → ?

Q6) a) Predict the product in the following reactions (any two) : **[5]**

i) D - Glucose $\xrightarrow{RSH/H^+}$? $\xrightarrow{\text{Raney Ni}}$?

ii) 

Conc. HCl → ? $NaOCH_3$, meOH → ?

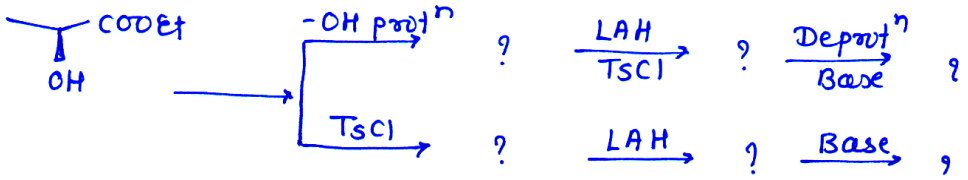
iii) 

i) HCl
ii) MsCl, pyridine → ? KN_3 / MeCN → ?

b) Attempt any one of the following : **[3]**

i) Give two applications of chiral Auxillary in asymmetric synthesis.

ii) Complete the following reaction sequence



c) Give the reaction sequence with proper reagent for the conversion of arabinose to Glucose. **[4]**

Total No. of Questions : 6]

SEAT No. :

P2811

[Total No. of Pages : 5

[5025]-41

M.Sc.

DRUG CHEMISTRY

CH-461 : Synthetic Methods in Organic Chemistry

(2008 Pattern)

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

i) Organo nickel compounds are used in synthesis of macrocyclic ring compounds.

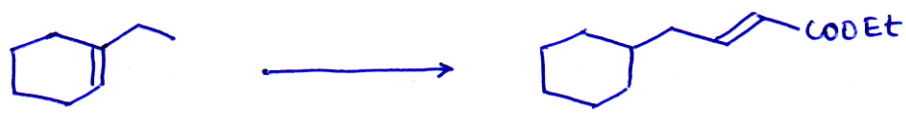
ii) THP protection is stable under alkaline conditions but are cleared under acidic conditions.

iii) Reconnection approach in the synthesis of 1,6-dicarbonyl compounds.

iv) Wittig reactions are preferred over normal elimination reactions for the synthesis of exocyclic olifins from cyclic ketones.

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

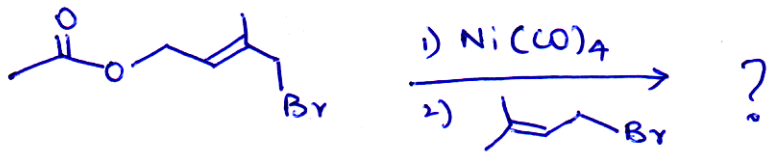
i) 

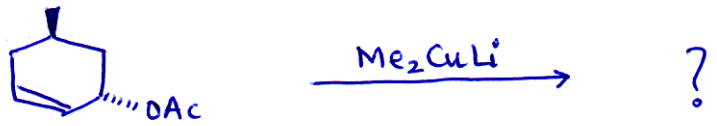
ii) 

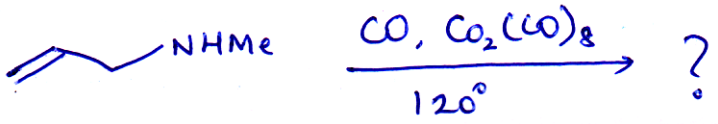
iii) 

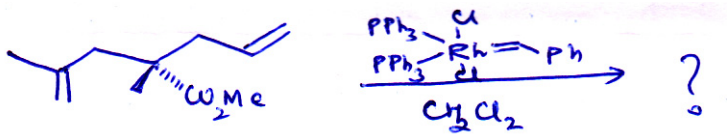
P.T.O.

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

i) 

ii) 

iii) 

iv) 

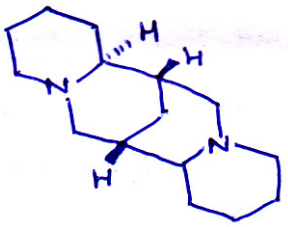
b) Discuss <u>any two</u> of the following : **[6]**

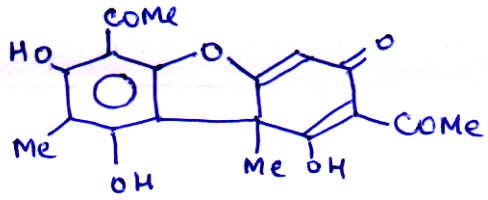
i) Use of $CO_2(CO)_8$ in Pausan Khand reaction.

ii) Role of $Na_2Fe(CO)_4$ in organic synthesis.

iii) Role of Ziegler-Natta Catalyst in polymerization reaction.

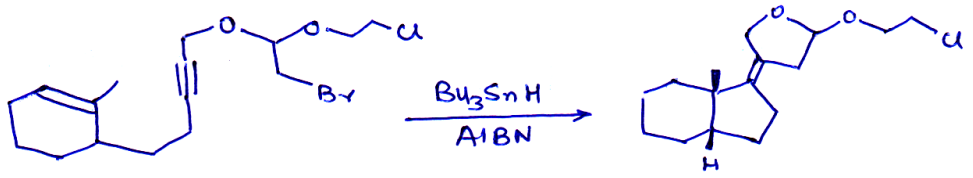
Q3) a) What is meant by biomimetic reactions. Explain how this method is used to obtain <u>any one</u> of the following : **[5]**

i) 

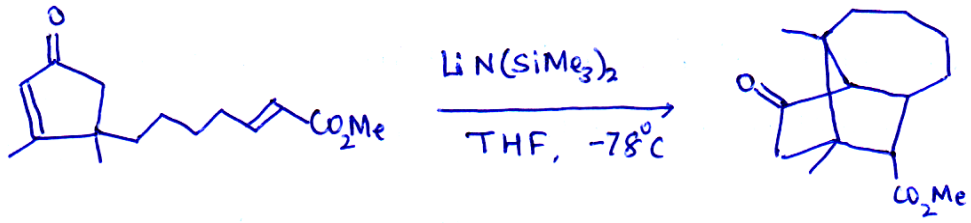
ii) 

b) Explain how domino reaction is preferred over multistep organic synthesis. Explain the steps involved in <u>any one</u> of the following domino reaction. **[5]**

i)



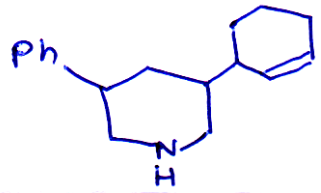
ii)



SECTION - II

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

i)



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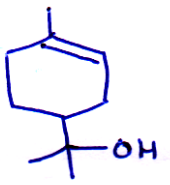
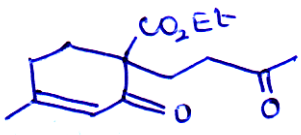
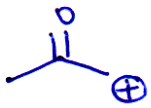


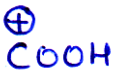
iii)

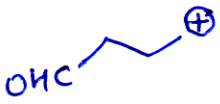
iv)



Q5) a) Give one reaction with reagent, for each synthon given below : **[6]**

i) 

ii) 

iii) 

b) Employing umpolung, carry out the following transformations (any two) : **[6]**

i) 

ii) 

iii) 

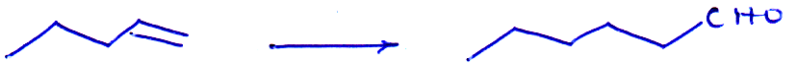
Q6) a) Give brief account of <u>any one</u> of the following : **[4]**

i) Use of Microwave and ultrasonication in organic synthesis.

ii) Ionic liquids in organic synthesis.

b) Answer <u>any four</u> of the following : **[12]**

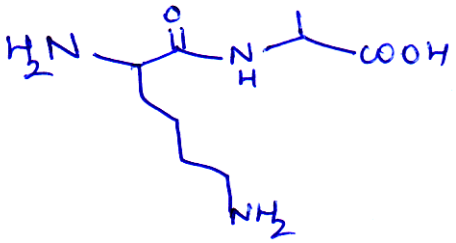
i) Carry out the following conversion using organoborane chemistry.



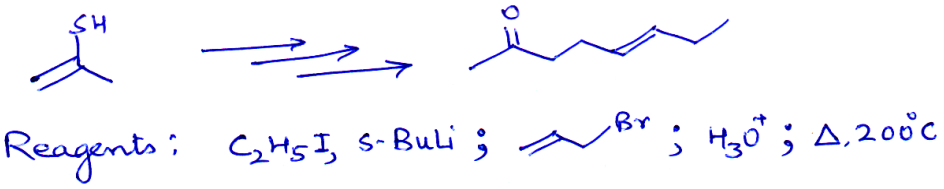
ii) Carry out the following transformation by enamine approach.

iii) Discuss three methods (name reactions) for the carbon-carbon double bond formation.

iv) Discuss the steps involved in the synthesis of the following peptide.



v) Carryout the following conversion using the reagents given below. Arrange the reagents in proper sequence.



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Total No. of Questions : 6]

SEAT No. :

P2812

[Total No. of Pages : 3

[5025]-42

M.Sc. (Semester - IV)

DRUG CHEMISTRY

CH-462 : Chemotherapy

(2008 Pattern)

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 three of the following : **[15]**

a) Discuss in brief the development of cephalosporins. Give an example of each from I^{st}, II^{nd} and III^{rd} generations with their benefits.

b) What are antibiotics? How are they classified. Discuss the selective toxicity associated with them.

c) Give a brief account of macrolide antibiotics. Explain their mechanism of action.

d) Give in brief, the discovery of carbapenems. What makes them super antibiotics. Discuss their mode of action.

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

a) What are common fungal diseases. Explain how antifungal agents amphotericin-B, Fluconazole and griseofulvin affect the fungal biochemical processes.

P.T.O.

b) Explain in brief the role of the following in managing CNS disorders.

i) Monoamine oxidase inhibitors

ii) Barbiturates

iii) Serotonin reuptake inhibitors

iv) Benzodiazepines

c) What are different strategies to combat cancer? Explain in brief the role of alkylating agents and antimetabolites in cancer treatment.

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

a) Leprosy

b) Malaria

c) Epilepsy

d) Sedatives

SECTION - II

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

a) How does the endocrine system maintains homeostasis? Explain the role of thyrotropin, calcitonin, parathyroid hormone and aldosterone.

b) Discuss in brief any two of the following :

i) Myocardial Infarction

ii) Stroke

iii) Angina

c) Discuss how the following diseases are managed by current drugs. (any two) :

i) Inflammation

ii) Tuberculosis

iii) Emesis

d) What are the common GIT disorders. Explain ulcers and the approaches to treat ulcers.

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

a) Describe in brief the functioning of pancreas. What happens in diabetis? Explain the use of following in treatment of diabetis.

i) Glitazones

ii) Biguanides

b) Describe enzyme inhibitors and their role in disease management. Discuss with examples their role as anticancer and antibacterial agents.

c) Discuss viral life cycle and explain the use of rimantadine and ribavirin as antiviral agents.

Q6) Give the mode of action and uses of the following drugs. (any four) : **[12]**

a) Methotrexate

b) Mefenamic acid

c) Propranolol

d) Meperitidine

e) Flucytosine

f) Doxorubicin

Total No. of Questions : 6]

SEAT No. :

P2813

[Total No. of Pages : 3

[5025]-43

M.Sc.

DRUG CHEMISTRY

CH-463 : Drug Design

(2008 Pattern)

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

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 the right indicate maximum marks.***

SECTION - I

Q1) Answer any two of the following : **[14]**

a) Explain in brief the applications of bioinformatics. Discuss proteome, genome & metabolome.

b) Discuss in brief the steps involved in making recombinant DNA & its products.

c) Explain in brief any two :

i) DNA vaccine

ii) Gene therapy

iii) Monoclonal antibody

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

a) What is the difference between average & mean. Calculate them for the age of 5 individuals 48, 79, 43, 21, 66.

P.T.O.

b) Explain any 3 of the following :

i) Standard deviation

ii) Coefficient of variation

iii) Normal distribution

iv) Regression

c) What is meant by correlation? State its different types. Compute Karl Pearson's coefficient of correlation for the data of height of sons and fathers in feet.

Height of sons:	5.2,	5.3,	5.5,	5.8,	5.9,	6.0,	6.0
Height of fathers :	5.1,	5.5,	5.8,	5.6,	5.6,	5.8,	5.9

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

a) Draw a diagram of cell membrane with its various components. Discuss the functions of cell membrane.

b) What is combinatorial chemistry? Discuss how it is used to make large number of compounds.

c) Explain in brief the benefits of prodrugs. Discuss with proper examples.

SECTION - II

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

a) Explain QSAR? How is it performed?

b) Discuss in brief molecular mechanics & molecular dynamics.

c) What are G proteins. Explain how they perform signal transduction.

d) Discuss the role of

i) Ion channel receptors

ii) Protein Kinase Receptors

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

a) Explain in brief

i) Ab Initio Method

ii) Conformational search

b) Discuss the topliss scheme for aromatic & aliphatic substituents & its applications.

c) How will you proceed to design a novel drug using computers as inhibitor at ACE (Angiotensin Converting Enzyme) inhibitor. The x-ray crystal structure of ACE is known.

Q6) Explain any five of the following terms in brief : **[10]**

a) Log P

b) Agonist & Antagonist

c) COMFA

d) 3D pharmacophore

e) Correlation coefficient

f) High thorough put screening

g) Antiport & symport

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