Total No. of Questions :6]

SEAT No. :

P2232

[Total No. of Pages : 4

[4825]-31

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 writen in separate answer books.***

SECTION-I

Q1) Explain any four of the following. **[12]**

a) 2-Acyl pyrrole undergoes nitration at 4-position and not the vacant 5-position.

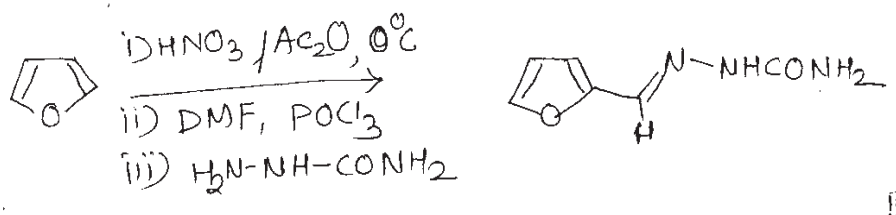
b) 4-chloro-3-nitropyridine hydrolyzes readily even in warm water.

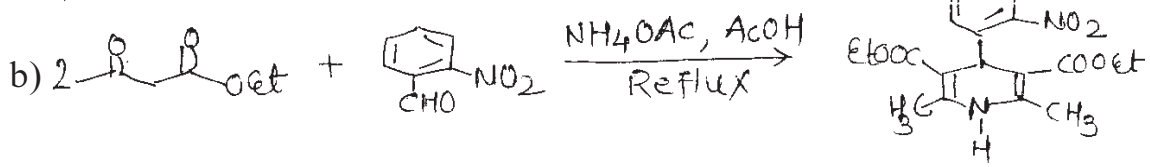
c) 2-methoxy 1,4 benzoquinone upon Nenitzescu- indole synthesis gives 6-methoxy indole derivative but not 7-methoxy & 4-methoxy indole derivative.

d) 4-methyl imidazole is better represented as 4(5)-methyl imidazole.

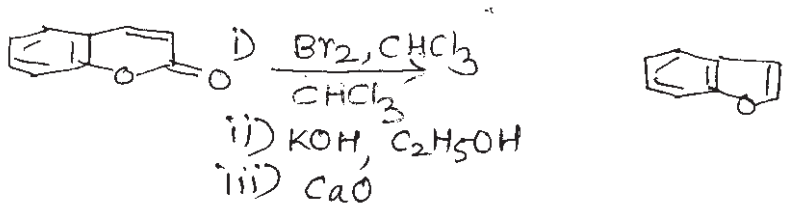
e) Coumarin is easily attacked by electrophilic as well as nucleophilic reagents.

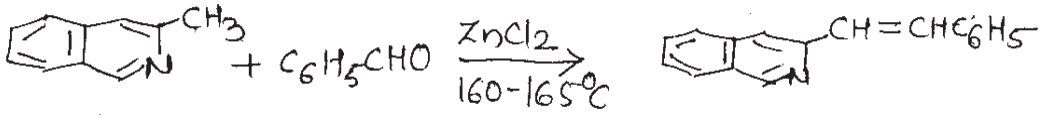
Q2) Suggest the suitable mechanism for any four of the following. **[12]**

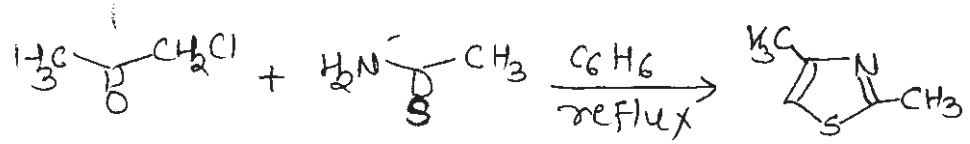
a) 

b) 

P.T.O.

c) 

d) 

e) 

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

i) Skraup synthesis using m-chloroaniline.

ii) Hinsberg thiophene synthesis.

iii) Pomeran z-fritsch synthesis.

iv) Knorr-pyrrole synthesis.

b) Attempt any two of the following. **[7]**

i) What is the action of following reagents on-pyridine-N-oxide.

1) BuLi, CO_2, H^+ 2) $(CH_3CO)_2O$

3) $P(C_6H_5)_3$.275-280ºC

ii) What is the action of following reagents on thiophene.

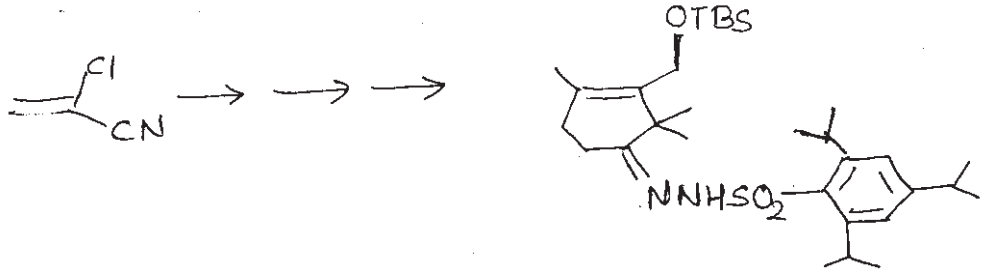
1) CH_2O, H^+ 2) Maleic anhydride

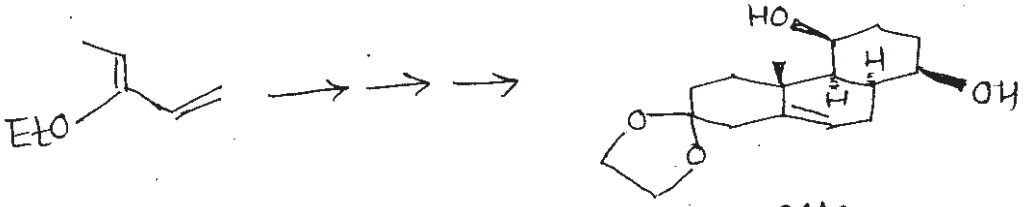
3) H_2SO_4,HNO_3

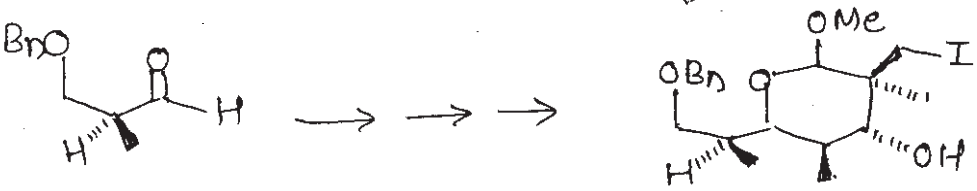
iii) Compare and contrast the reactivities of benzene, pyrrole and pyridine with nucleophiles and electrophiles.

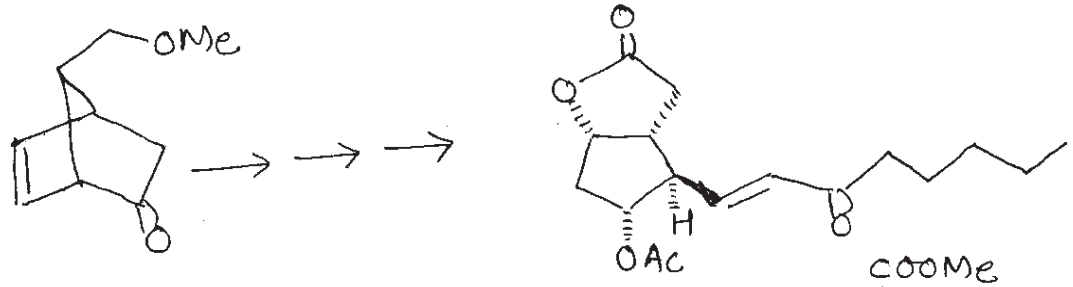
SECTION-II

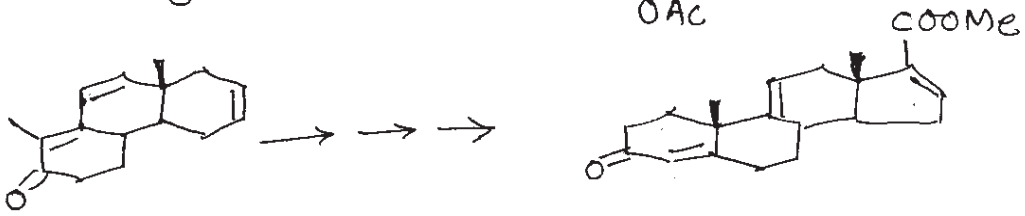
Q4) Discuss the steps involved in the synthesis of the following molecules. Explain the stereochemistry and mechanism involved in all steps (any three) **[15]**

a) 

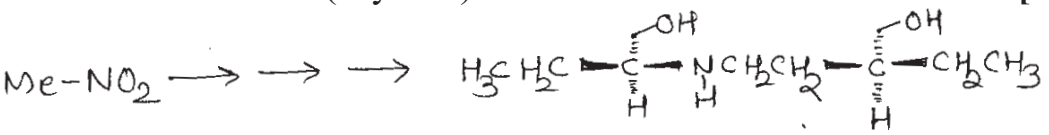
b) 

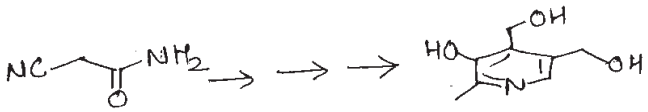
c) 

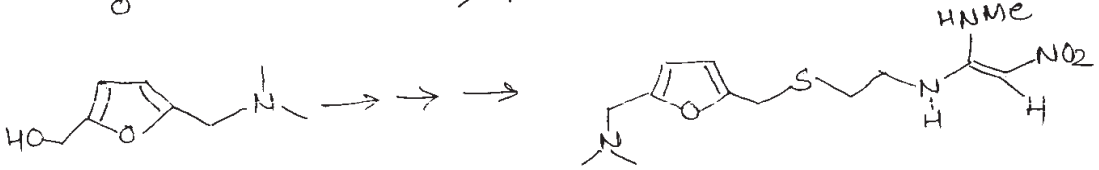
d) 

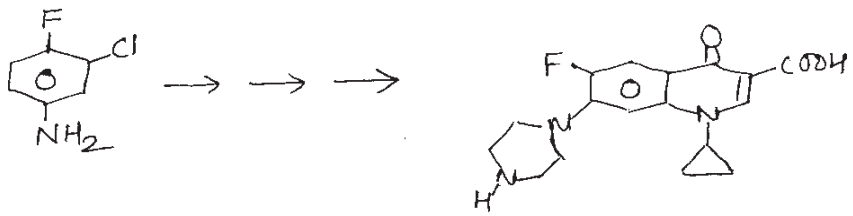
e) 

Q5) Discuss the synthesis of the following drugs, comment on the reagents used and mechanism involved (any four). **[16]**

a) 

b) 

c) 

d) 

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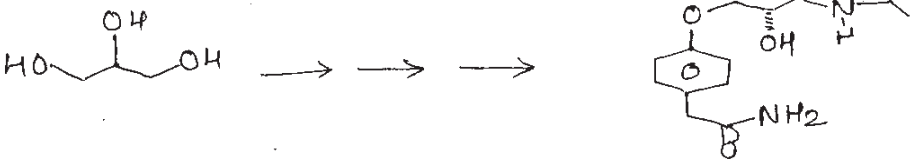
f) 

Q6) Discuss with examples any three of the following reactions. **[9]**

a) Olefin metathesis.

b) Suzuki Reaction.

c) Mcmurry coupling.

d) Narasaka boron template strategy.

Total No. of Questions :6]

SEAT No. :

P2233

[Total No. of Pages :5

[4825]-32

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

SECTION -I

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

a) Absorption frequencies in Hz are field dependent where as coupling constants are field independent in 'HNMR.

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

c) Benzyl acetate shows base peak at M-42 in its MS.

d) Mono substituted epoxide shows twelve lines for epoxide protons in 'HNMR.

e) Sensitivity of ^{13}C signal is about 6000 times less intense then 'H signal in NMR.

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

a) Predict the structure

M.F. : $C_6H_5Br_2N$
I R : 3420, 3315, 1612 cm^{-1}
'HNMR : 4.5 (bs, 2H) 6.4 (t, 7.5Hz, 1H)
7.3 (d, 7.5Hz, 2H)
CMR : 109, 119, 132, 142
DEPT 135 : 109, 142 absent
119, 132 up
DEPT 90 : 109, 142 absent
119, 132 up

P.T.O.

b) Predict the structure

M.F. : $C_6H_6N_2O$

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

Mass : 122(M^+), 106, 78, 51, 44

c) An eight carbon compound shows following spectral data. Find the structure and assign the signals.

UV : 199 (ϵ = 19200) 245(ϵ = 10,900)

I R : 1690, 1600, 690 cm^{-1}

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

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

d) Predict the structure

CMR : Four peaks in the region 125 - 145δ

I R : broad 2500 - 3500 cm^{-1} & 1680 cm^{-1}

Mass : 136(M^+), 119, 92, 91 (100%), 65, 39

e) Assign the structure and justify your answer

M.F. : $C_7H_{10}O_2$

PMR : 1.41 (d, 7Hz, 3H) 2.4 (t, 7Hz, 2H)

4.53 (sextet, 7Hz, 1H) 5.89 (tq, 7 & 2Hz, 1H)

2.1 (d, 2Hz, 3H)

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

a) Applications of chiral shift reagents.

b) Soft ionization technique in MS.

c) Application of HET COR in NMR.

d) AB spin system

SECTION -II

Q4) a) Explain the genesis of following ions (Any three): **[9]**

i) p - chloroaniline 129, 127, 102, 100, 92

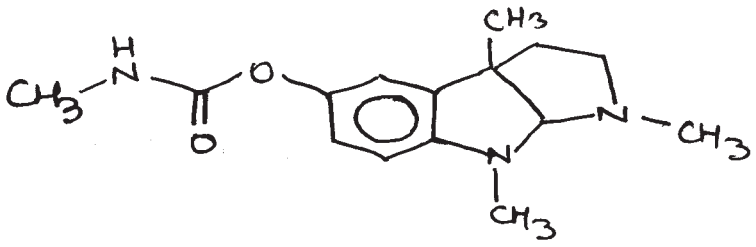
ii) 4 - Methylpentan - 2-one 100, 85, 58, 57, 43, 41, 29

iii) N-Methyl pyrrolidine 85, 84, 57, 42

iv)  174, 131, 117, 69, 61

b) A compound has molecular ion peak at m/e = 78 with relative intensity of 23.6. The intensities of isotope peaks at 78(23.6) 79(1) 80(7.55) 81(0.28). Establish the molecular formula. **[3]**

Q5) a) The PMR spectrum of compound shows the following signals. Assign the chemical shifts to different protons and explain their coupling constants. Justify your choice. **[6]**



PMR : 1.42 (s, 3H) 1.95 (t, 6Hz, 2H) 2.55(s,3H)

2.7 (t, 6Hz, 2H) 2.82 (d, 6Hz, 3H)

2.92 (s, 3H) 4.12 (s, 1H) 5.33 (q, 6Hz, 1H)

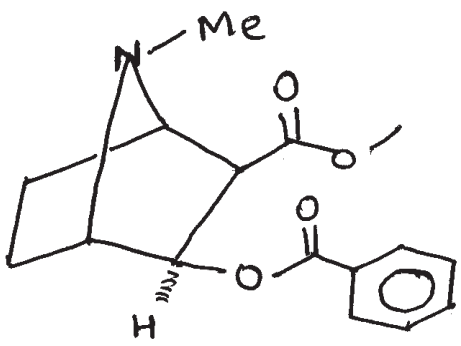
6.37 (d, 8Hz, 1H) 6.78 (d, 2Hz, 1H)

6.87 (dd, 8 & 2Hz, 1H)

spin decoupling Expt:

	Irradiation at	Change at
i)	2.82	5.33 (q) $\rightarrow$ (s)
ii)	1.95	2.70 (t) $\rightarrow$ (s)

b) Assign the carbon signals in the following compound with justification **[4]**



25.8(t) 35.9(t) 41.4(q)

50.8(d) 51.5(q) 62.1(d)

65.4(d) 67.5(d) 129.1(d)

130.5(S) 131.0(d) 130.0(d)

167.1(S) 171.6(S)

c) Answer <u>any two</u> of the following: **[6]**

i) Discuss the theory and instrumentation of GLC.

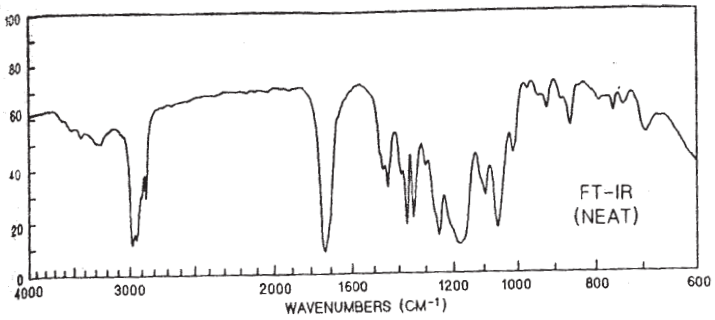
ii) Draw schematic diagram of HPLC and give its applications.

iii) Explain

1) Theoretical plates

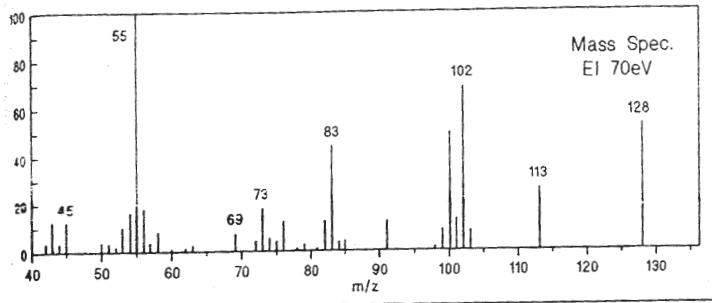
2) Reverse phase column chromatography

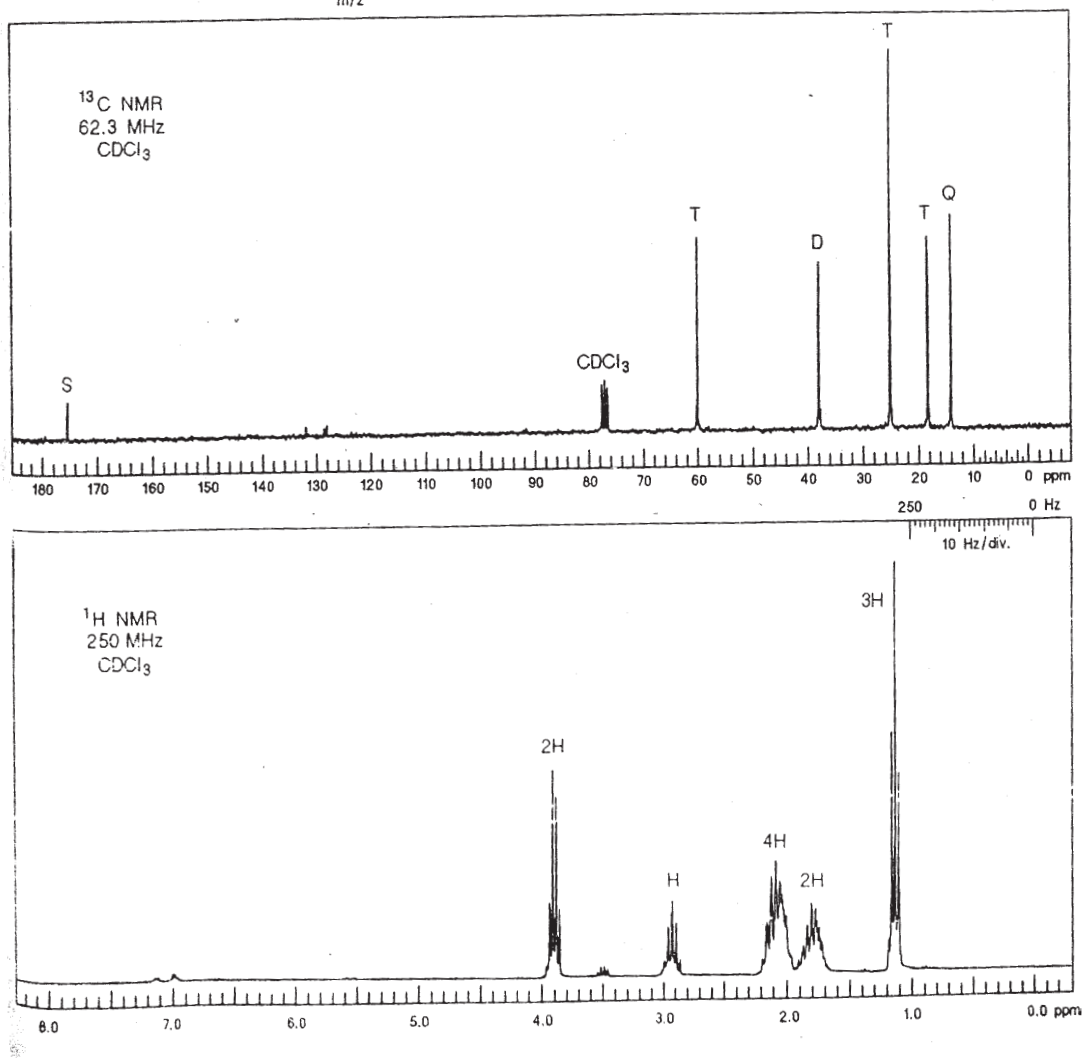
Q6) A compound exhibits following spectral properties shown on the attached sheet. Suggest the structure for the compound and explain the observed spectral data. **[12]**



Exact M.S. (EI) = 128.0837

$UV\lambda_{max}$ = BLANK





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Total No. of Questions : 6]

SEAT No. :

P2234

[Total No. of Pages : 3

[4825]-33
M.Sc.
DRUG CHEMISTRY
CH - 363 : Drug Development
(Semester - III) (2008 Pattern)

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

Instructions to the candidates:

1) ***All questions are compulsory.***
2) ***Answer to the two sections to 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) Give a step-wise protocol for screening soil samples to isolate micro-organisms producing anti-metabolites.

b) Explain use of crude 'N' and 'C' sources used in media for large scale production of antibiotics.

c) Diagramatically illustrate the typical formentation equipment, used for anaerobic processes.

d) Define MIC, explain the microbiological assay procedures for MIC determination.

e) Explain working of effluent treatment plants.

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

a) With the help of diagrams, explain the function of secondary lymphoid organs.

b) Explain Radio-immuno-Assay technique.

P.T.O.

c) Waht are vaccines? Giving suitable examples, explain use of vaccines in control of infections diseases.

d) Define and explain

i) Antigen ii) Adjuvant

iii) Immunomodulator

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

a) Give a brief account of the historical aspects of drug discovery. Comment on Ayurveda.

b) What is the new for so many dosage forms of drugs? Explain with proper example.

c) Explain the following terms

i) Potency of a drug ii) Therapeutic window

iii) Orphan drug iv) New Chemical Entity

v) Investigational New Drug

SECTION - II

Q4) Answer any two of the following: **[14]**

a) What is a patent? What can be patented? Discuss the process invovled in the grant of a patent.

b) Explain in brief how are clinical trials performed? What are the alyictives of phase I & phase II? How does phase II difer from phase III?

c) In brief discuss how toxicological evaluation of an NCE is performed. Explain the significance of these tests.

Q5) Answer any three of the following: **[18]**

a) What strategies are adopted for lead discovery - discuss with examples.

b) Explain in brief pharmacokinetics of an oral dosage form.

c) How are SAR studies carried out? How does the SAR studies help in identifying the functional groups important for a molecule to exhibit activity? Explain Bioisosteres & Isosteres.

d) Give an overview of the way applied for checking the biological activity of an NCE.

Q6) Expalin in brief any four of the following: **[8]**

a) Process development

b) Drug Metabolism

c) Pharma coepia

d) Lead development

e) Quality Assurance

Total No. of Questions :6]

SEAT No. :

P2235

[Total No. of Pages : 5

[4825]-34

M.Sc.

DRUG CHEMISTRY

CH-364: Stereochemical Principles & Applications

(2008 Pattern) (Semester - III)

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

Instructions to the candidates:

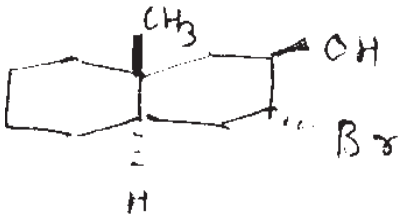
1) ***All questions are compulsory.***
2) ***Figures to the right side indicate full marks.***
3) ***Answer to the two section should be writen in separate answer books.***

SECTION-I

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

a) In 3 & 4 membered rings $SP^2 \rightarrow SP^3$ is facile process where as in 5 membered rings $SP^3 \rightarrow SP^2$ is facile process. Explain.

b) Which of the conformation will form epoxide on treatment with base. Explain in brief.



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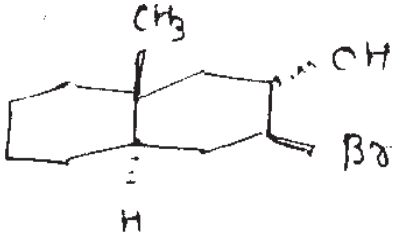


II

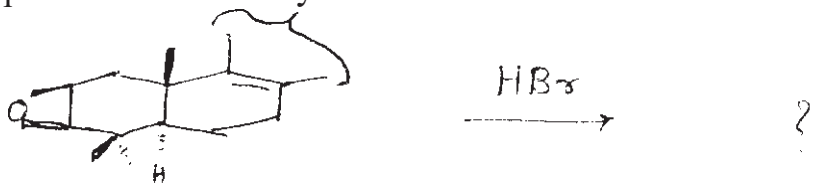
c) Cis 4 hydroxy cyclohexane carboxylic acid lactonizes, while the trans isomer does not.

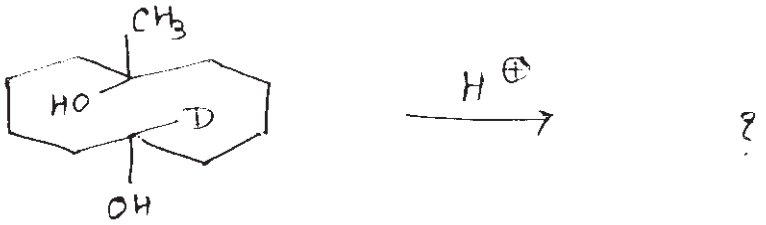
d) Draw the structures of cis. Anti- trans & cis anti cis isomers of perhydro anthracenes & compare their stability & comment on their optical purity.

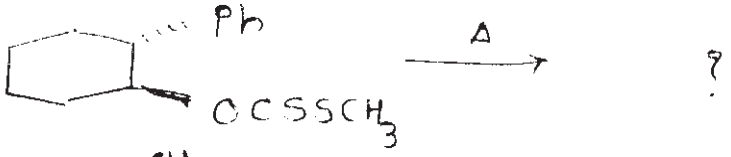
e) β. isomer of hexachlorocyclohexane reacts very slowly with base than any of its isomer. Explain.

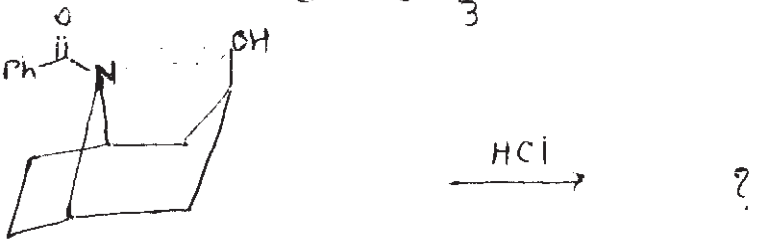
P.T.O.

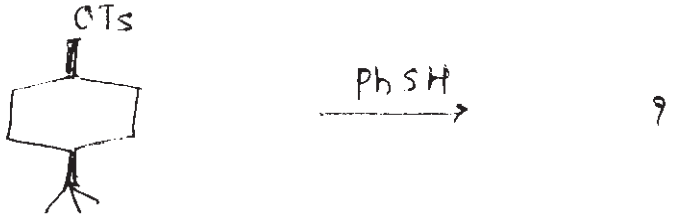
Q2) Predict the product/s in <u>any four</u> of the following & explain the stereochemical principles involved. Justify. **[12]**

a) 

b) 

c) 

d) 

e) 

Q3) Discuss <u>any three</u> of the following. **[12]**

a) Bredt's rule with two example.

d) 2-Alkyl-keto effect.

c) Optical activity of cis & trans isomer of bicyclo [4,3,0] Nonane (hydrindane).

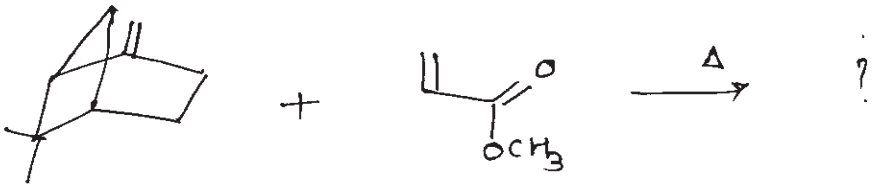
d) Transannular Interactions.

SECTION-II

Q4) a) Construct the co-relation diagram for 1,3,5 hexatriene to 1,3 cyclohexadiene & show that for this interconversion disrotation is required for thermal reaction. **[4]**

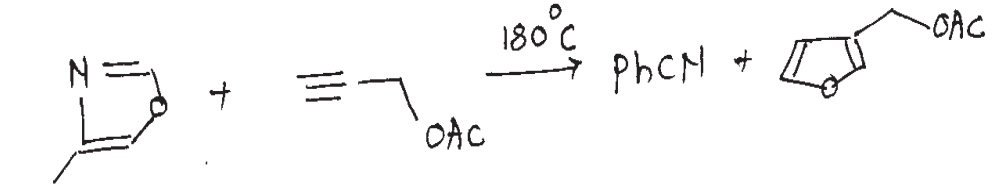
b) Predict the products in the following reactions (any two). **[4]**

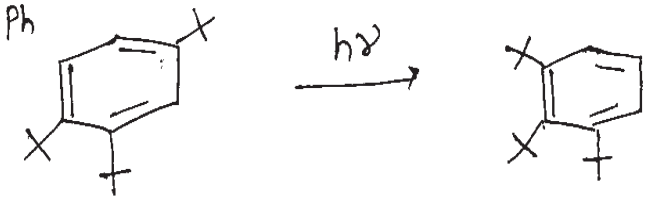
i) 

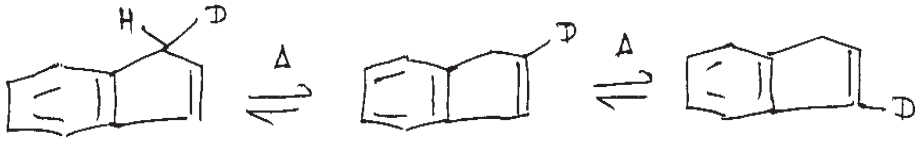
ii) 

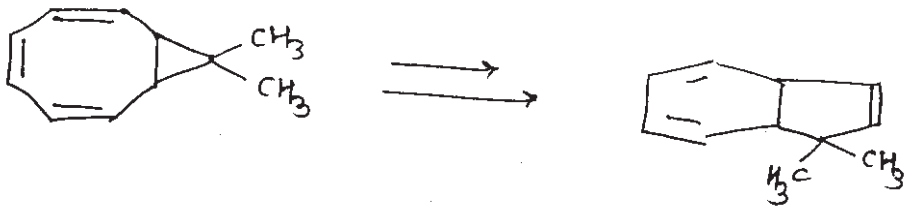
iii) 

c) Suggest the mechanism for <u>any three</u> of the following. **[6]**

i) 

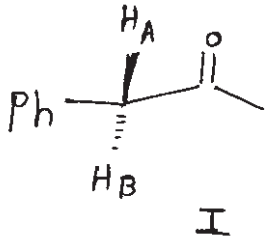
ii) 

iii) 

iv) 

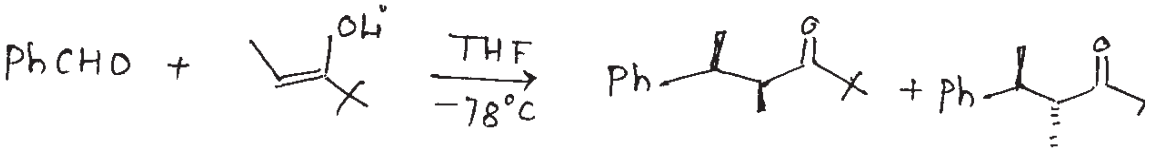
Q5) a) Attempt the following (any three) **[6]**

i) Write pro R/pro S for H_A & H_B in compound I



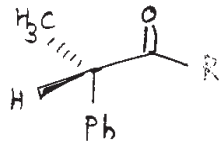
I

ii) Calculate the diastereomeric excess in the following reaction.



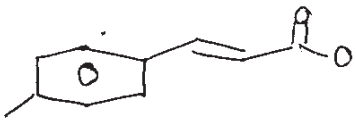
78·7 % 21·3 %

iii) Write Re & Si faces for the following compound
Ph (CH_3) $CHCOCH_3$

iv) 

$\xrightarrow[THF]{PhMgBr}$? (major) + ? (minor)

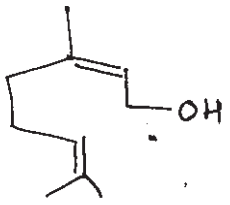
b) Predict the product in the following reactions (any two) **[4]**

i) 

$\xrightarrow[K_2CO_3,\ DHQ\ Ligand]{OsO_4,\ K_3[Fe(CN)_6]}$?

ii) 

$\xrightarrow{conc.\ HCl}$? $\xrightarrow[CH_3OH]{NaOCH_3}$?

iii) 

$\xrightarrow[Ti(O^iPr)_4]{(-)\ DET}$?
TBHP

c) Write short note on <u>any two</u>. **[4]**

i) Cram's Rule

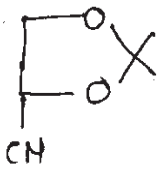
ii) CBS reduction

iii) Chiral Pool strategy

Q6) Attempt the following (any four) **[12]**

a) Complete the following reaction sequence.

i) D- Glucose $\xrightarrow{RSH/H^+}$? $\xrightarrow[\text{one equivalent}]{TsCl/\text{pyridine}}$?

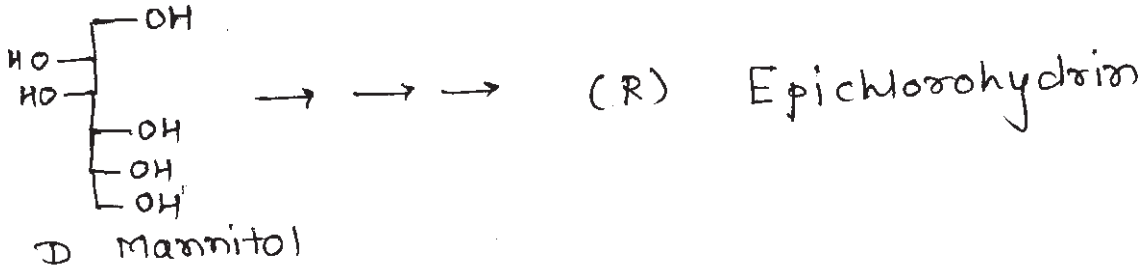
ii)  $\xrightarrow[\text{ii) MsCl, pyridine}]{\text{i) HCl}}$? $\xrightarrow[MeOH]{NaOCH_3}$?

b) Write short note on "Anomeric effect"

c) Write ring structure for

i) D-Glucose $\rightarrow$ D- Gluco- furanose.

d) Complete the reaction.



e) Give the reaction sequence with proper reagent for the conversion of arabinose $\rightarrow$ Glucose.

Total No. of Questions : 6]

SEAT No. :

P2236

[Total No. of Pages : 4

[4825]-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 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) Formation of 4, 4′ - dimethoxy benzoin from p-anisaldehyde involves umpolung of reactivity.

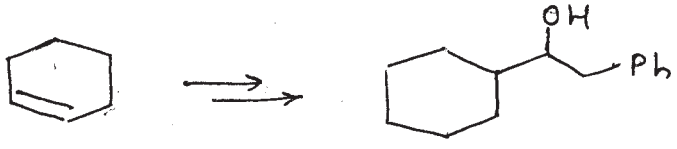
ii) Benzoyloxy carbonyl protection is preferred over benzoyl protection in the amino group protection in peptide synthesis.

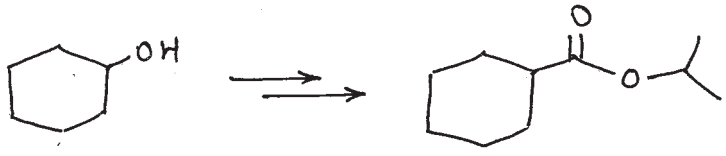
iii) Role of Zeigler - Natta catalyst in polymerization reaction.

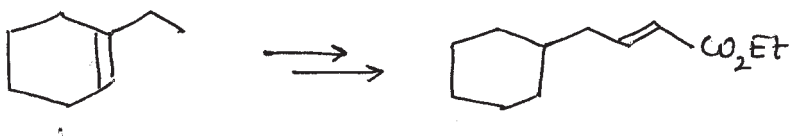
iv) Tertiarybutyl dimethylsilyl is used for selective protection of 5′-hydroxy group in deoxynucleoside.

v) Ph CHO could be converted into Ph CO CH (OH) CH_3 using umpolung of reactivity.

b) Complete Any Two of the following transformations justify your answer: **[6]**

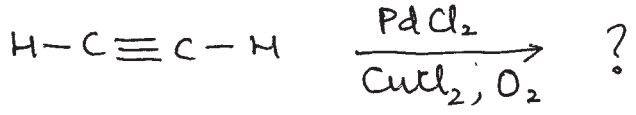
i) 

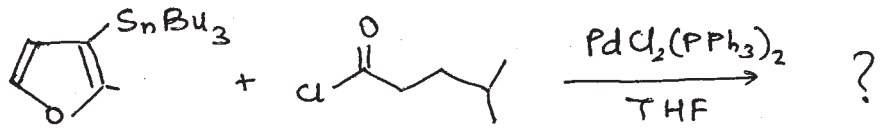
ii) 

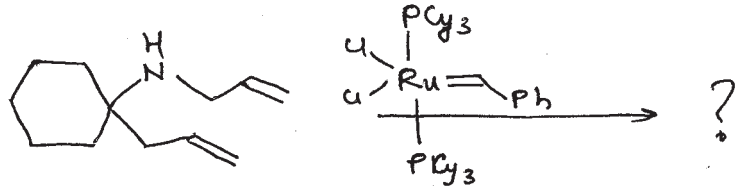
iii) 

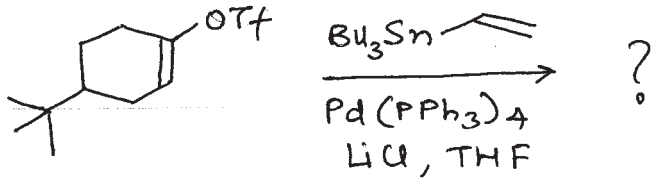
P.T.O.

Q2) a) Predict the product explaining the role of transition metal complex (Any Three): **[9]**

i) 

ii) 

iii) 

iv) 

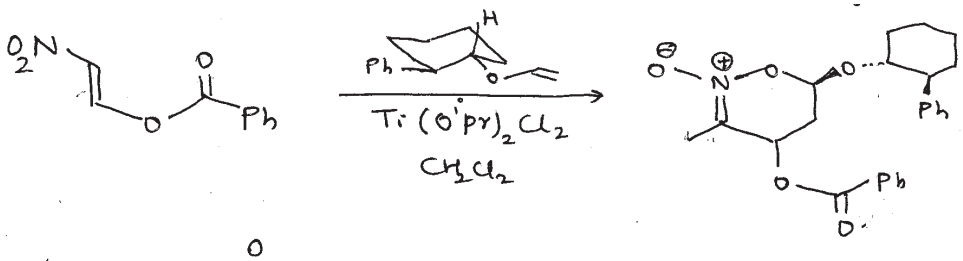
b) Explain <u>Any Two</u> of the following: **[6]**

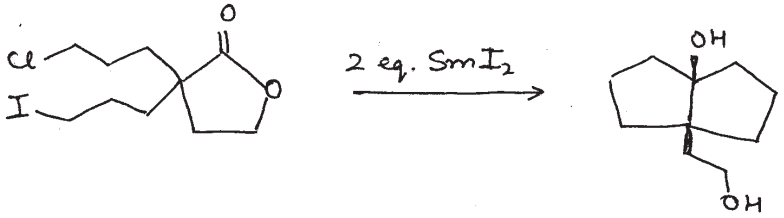
i) Carbonylation reaction of organoboranes.

ii) Oxo process.

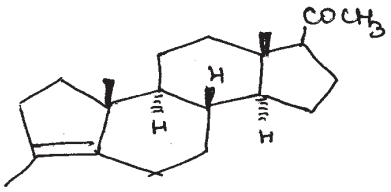
iii) Horner - Wadsworth - Emmons reaction.

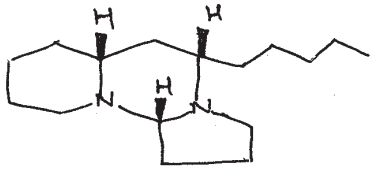
Q3) a) What is Domino reaction? Explain the steps involved in <u>Any One</u> of the following: **[5]**

i) 

ii) 

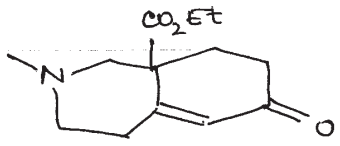
b) Explain the biomimetic approach to the retrosynthesis of Any One of the following: **[5]**

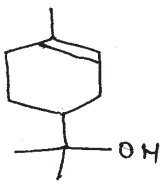
i) 

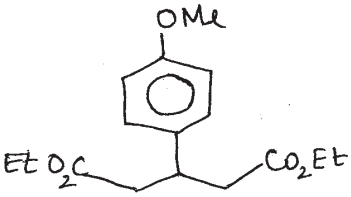
ii) 

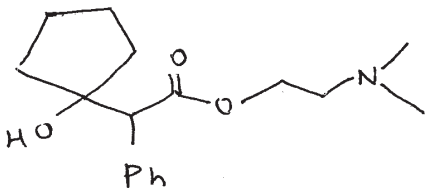
SECTION-II

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

i) 

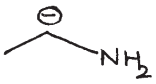
ii) 

iii) 

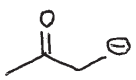
iv) 

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

i) 

ii) 

iii) 

iv) 

b) Using method of umpolung carry out following transformations (Any Two): **[6]**

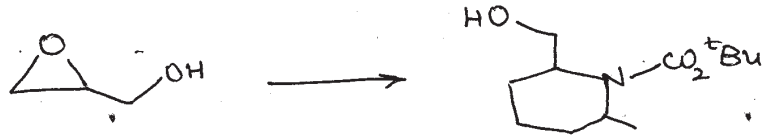
i) 

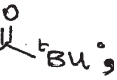
ii) 

iii) 

Q6) a) Answer <u>Any Four</u> of the following: **[12]**

i) Arrange the reagents in proper order to carry out the conversion



$PhCH_2Br$, NaH ; PCC ; $NH_2OH.HCl$; H_2/Pd-EtOH ; 

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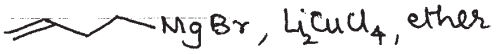
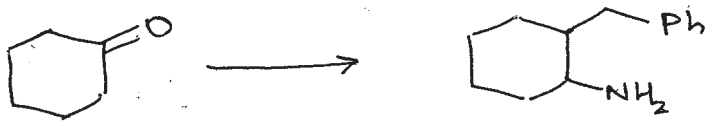
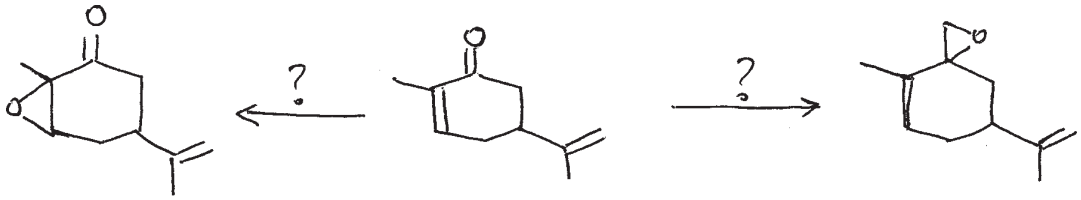


ii) Carry out the following transformation by enamine approach.

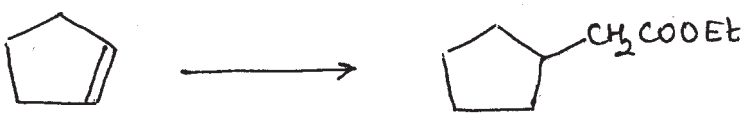


iii) Discuss various protecting groups used for protection of hydroxyl groups in nucleosides.

iv) Suggest the suitable reagents.



v) Explain how organoborane can be used to bring about the following transformation.



b) Attempt <u>Any One</u> of the following: **[4]**

i) Use of microwave and ultrasound in organic synthesis.

ii) Atom economy in Green Chemistry.

●●●●●

Total No. of Questions :6]

SEAT No. :

P2237

[Total No. of Pages :3

[4825]-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 full marks.***

SECTION -I

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

a) Discuss in brief cell wall synthesis and discuss the mechanism of action of β-lactam antibiotics.

b) Discuss the discovery of quinolone antibiotics. Comment on the development of fluoroquinolones and give an brief account of their role in antibacterial therapy.

c) Discuss in brief various steps involved in protein synthesis. How tetracyclines and aminoglycosides exert their antibiotic action?

d) What is drug resistance? Explain with suitable examples the mechanism of drug resistance and strategies to combat drug resistance.

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

a) Discuss in brief biochemical basis and causes of cancer. What are different classes of anticancer agents. Explain the importance of vinca alkaloids in cancer treatment.

P.T.O.

b) Discuss in brief intra and interneuronal signal transmission. Explain brief how this process is affected in depression. Give an brief account of various antidepressants.

c) Give an brief account of common viral infections. Discuss the agents interfering with viral nucleic acid replication in details.

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

a) Anticonvulsants

b) Analgesics

c) Antifungalagents

d) Sedatives

SECTION -II

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

a) Explain the mechanism of inflammation. Discuss how indomethacin, piroxicam and celecoxib exhibit their effect.

b) Explain in brief the organization of endocrine system. What is negative feedback mechanism? Discuss the role of thyroid hormones.

c) Explain in brief any two of the following CVS disorders. Discuss the pathophysiological changes and at least on drug to treat them.

i) Congestive Heart Failure

ii) Arrhythmia

iii) Angina pectoris

d) Explain how the following group of compounds help in management of disease (any three)

i) Vasodilators

ii) Phosphodiestrase III Inhibitors

iii) Na^+ channel blockers

iv) Organic nitrates

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

a) Describe in brief following common GIT disorders. What are common strategies to treat them (any two)

i) Nausea and vomitting

ii) Hyper acidity

iii) Diarrhoea

b) Explain the life cycle of plasmodium and explain the role of mefloquin and pyrimethamine as antimalarials with their mechanism of actions.

c) What is diabetis? Discuss in brief IDDM and NIDDM. Explain how oral hypoglycemic agents control the blood sugar level.

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

a) Cimetidine

b) Thiacetazone

c) Chloramphenicol

d) Cefaclor

e) Carmustine

f) Gentamicin

EEE

Total No. of Questions : 6]

SEAT No. :

P2238

[Total No. of Pages : 3

[4825]-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 to be written in separate answer books.***
3) ***Figures to the right indicate maximum marks.***

SECTION - I

Q1) a) Explain the terms in brief: **[4]**

i) Proteomics

ii) Gene microchips

iii) Restriction endonucleases

iv) Gene libraries

b) Attempt any two of the following: **[10]**

i) Give principle and applications of gene therapy.

ii) Describe use of transgenic animals as disease models.

iii) Explain steps in preparation of monoclonal antibodies.

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

a) Define Mean, Median and Mode, compute the same for following data.

Wt. of babies (kg)	0-4	4-8	8-12	12-16	16-20
No.of babies	8	12	15	11	4

P.T.O.

b) Define probability of an event. The probability that two persons A and B independently solving a particular problem of 0.5 and 0.4 respectively. Find the probability that the problem is solved.

c) In an experiment of pea breeding, out of 1600 seeds 911 were found to be round and green, 292 were wrinkled green, 306 were round and yellow and 91 were wrinkled yellow. Does this data agree with Mendel's ratio for these types of seeds which is 9 : 3 :3 : 1. Test at 5% level of significance ($\chi^2_{3,5} = 7.815$).

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

a) What is combinatorial chemistry? How does it aid in drug discovery and development. Discuss in brief the methods used for mixed and parallel synthesis.

b) How has prodrug approach helped in designing better drug molecules? With proper illustrations justify.

c) Give a brief commentory on membrane bound receptors using secondary messenger signalling system. Why their study is important in drug designing.

SECTION - II

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

a) Discuss the receptor theories of drug action and explain agonist, antagonist, partial agonist and partial antagonist.

b) How was Hansch analysis was developed? Discuss in brief. Explain the role of lipophilicity in drug action.

c) Discuss in brief the molecular mechanics force field equation. Explain the various terms.

d) Explain in brief

i) Quantum mechanics

ii) Molecular dynamics

iii) Monte-Carlo Method.

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

a) Discuss in brief the design of histamine antagonist ranitidine starting with the structure of histamine. Explain the design criteria.

b) How will you design a drug using the topliss scheme.

c) Discuss in brief docking methods in virtual screening.

Q6) Answer any two of the following: **[10]**

a) Role of bioinformatics and databases in drug discovery.

b) Discuss the steps involved in 3D QSAR. What are the benefits over routine QSAR.

c) Explain in brief how E_S, σ, π are calculated for QSAR studies.