POKHARA UNIVERSITY

School of Health and Allied Sciences

Second Term Examination/Spring Semester/2011

Full marks:
Time: 3 h

Program: B. Pharm.
Course: PHG 282 (Natural Products Chemistry)

Attempt all questions:

1. a) Explain the importance of mass spectrometry.
   b) Write down the biosynthesis of glutamate family.

2. a) How are aromatic amino acids synthesized?
   b) Explain the biosynthetic pathway for fatty acids.

3. a) Explain the nomenclature of prostaglandins.
   b) Classify monoterpenoids with examples.
   c) Explain the constitutions of myrcene.

4. a) What do you understand by nitrosyl test?
   b) How can you determine the number and position of side chains in β-carotene?

5. a) Write down the synthesis of vitamin A.
   b) Define steroids? How can you determine the ring system for steroids?

6. a) Explain the biosynthesis of cholesterol.
   b) Draw the structures of different types of vitamin Ds.

7. Write short notes on any two:
   a) Concept of chemotaxonomy
   b) Alkaloids
   c) Chemistry of vision

POKHARA UNIVERSITY

June 2

Level: Bachelor
Programme: B.Pharm
Course: Pharmacognosy IV (Natural Product Chemistry)

Semester: Fall

Year: 2012
Full Marks: 100
Pass Marks: 45
Time: 3hrs.

4th sem

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

a) Discuss about pharmacological screening in the new drug discovery and the procedure for obtaining active principles from plants. 7

b) Describe the problems that encounter during pharmacological screening of plant extracts. 8

a) What are the approaches to primary pharmacological screening? Explain about the computerized evaluation in the pharmacological screening. 8

b) Pharmacological screening programmes should never miss useful activities. Mention some requirements, approaches, potential problems/challenges and future perspectives to achieve this. 7

a) Various classes of natural products (i.e. diterpinoid, sesquiterpinoid, alkaloids) have been reported to impart diverse cytotoxic and antitumor activities. Enlist examples. 7

b) Describe macrolide antibiotics along with the structure. 8

Define and classify iridoids. Mention various biologically active sesquiterpenoids. 8

b) Discuss the pharmacological activities and known hazards of ginseng. 7

a) Cell based High Throughput Screening (HTS) might be best method for screening anticancer and antimicrobial activity than Target based HTS. Justify with examples. 7

) Write a short note on detoriation of crude drugs. 8

) What are plant growth regulators? Characterize gibberelins along with its applications. 8

b) **What are opoids? Describe about morphine along with its semi-synth derivatives.**

7. **Write short notes on any two.**

a) Life cycle of ergot

b) Multidimensional secondary screening

c) Storage of crude drugs

10 June 21, 2012

POKHARA UNIVERSITY

Level: Bachelor
Programme: B.Pharm
Course: Pharmacognosy II (Spectroscopy)

Semester: Fall

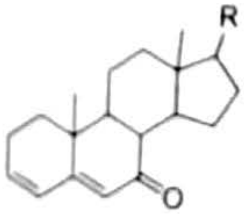
Year: 2012
Full Marks: 100
Pass Marks: 45
Time: 3hrs.

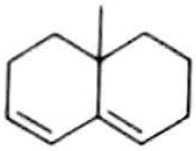
Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

a) What is meant by spectroscopy? What types of structural information can be obtained from UV, IR, NMR spectroscopy and mass spectrometry? 5

b) Maximum wavelength $CH_2=CH_2$ is 175 nm whereas maximum wavelength for C=O is 160,185and 280 nm in UV visible spectroscopy. Explain with suitable reason. 5

c) Calculate the expected λ_{Max} for the following compounds by using Woodward rules. 5





2. a) How many types of electronically nonequivalent protons are present in each of the following compounds and thus how many NMR absorptions might you expect in each? 8

b) The multiplicities of the signal of CH_3 protons are triplet while CH_2 are quartet in the proton NMR spectra of Chloroethane. Describe with suitable reason. 7

(i) CH_3CH_2Br
(ii) $CH_3CH_2CH_2NO_2$
(iii) Methyl benzene
(iv) Cis- Hex-3-ene

CH_3-CH_2-OH and $H_3C-O-CH_3$

2  and 

3  and $CH_3-CH_2-C\equiv C-CH_3$

4 CH_3-CH_2-COOH and $HO-CH_2-CH_2-CHO$

a) How do you distinguish following pairs of compounds by the use of IR spectroscopy?

b) Describe the different mode of vibration of $-NH_2$ group in IR spectroscopy.

c) Wave number of O-H bond stretching is 3300 cm^{-1}. Calculate its frequency and bond strength.

4. a) What are the major factors that influence chemical shift? Explain.

b) Describe COSY, DEPT and HMQC with example.

5. a) Describe the fragmentation pattern of 4-heptanone in Mass Spectroscopy.

b) Explain the principle of mass spectrometry.

c) Define β- fragmentation, McLafferty rearrangement and retro-Diels Alder reaction with examples.

6. a) A $C_4H_8O_3$ compound has strong infrared absorption at 2500 to 3300 cm^{-1} and 1710 cm^{-1}. The ^1H NMR spectrum has four signals: a doublet at δ1.2 (3H), a quartet at δ 4.5(1H), a singlet at δ 3.6(3H) and a singlet at 12.5 ppm. The ^{13}C NMR spectrum has four signals at δ 177, 70, 54 and18 ppm. Suggest a structure for this compound.

b) The ^{1} H NMR spectrum of a compound ($C_{14}H_{22}$) has two singlets at δ 1.1 and 7.25 ppm (ratio = 9:2). The ^{13}C NMR spectrum shows four signals at δ 147, 125, 39.3 and 30.8 ppm. Suggest a structure for this compound.

c) Write mechanism of action, uses, adverse effects and contra indicat of Estrogens.

7. Write short notes on **(Any Two):**
   a) Antifungal agents.
   b) Drug addiction and abuse
   c) Psoralen Ultraviolet A

POKHARA UNIVERSITY
School of Health and Allied Sciences
Second Terminal Examination

Level: Bachelor
Programme: B.Pharm
Semester: IV
Course: Pharmacognosy III (PHG 282)

Year: 2012
Full Marks: 100
Pass Marks: 45
Time: 3 hrs

Candidates are required to give their answers in their own words as far as practicable. The figures in the margin indicated full marks

Attempt all the questions

1. a) Define primary and secondary metabolites. List out some important drugs discovered from natural products and discuss their role in health care system. 5
   b) How the active principles from natural sources are bio-assayed? Discuss briefly. 5
2. a) Elaborate the general techniques for obtaining natural products from plants. 6
   b) What is Co-TLC? Write an account of TLC based on its principles and applications. 5
   c) How does the ion exchange chromatography differ from affinity chromatography? 5
3. a) How does the spectral approach help to elucidate the structure of natural products? 5

OR

Explain the following terms:

(i)	Shielding effect	(iii)	Finger print region
(ii)	Chemical shift	(iv)	Base peak

b) What is resonance in NMR spectroscopy? Discuss the application of mass spectroscopy. 5

4. a) Differentiate between biosynthesis and biogenesis. Describe some important reactions involved in the biosynthesis of natural products. 5
   b) Outline the biosynthesis of atropine alkaloid. 5

OR

How aromatic amino acids are biosynthetically formed? Explain.

5. a) What do you mean by "Series 2" and "Series 1" products in the biosynthesis of prostaglandin? Write about the physiological function of prostaglandins. 5
   b) List out some saturated and unsaturated fatty acids and explain their general biosynthetic path way. 5
6. a) Discuss the biosynthesis of a linear range of monoterpenes. 5
   b) Distinguish between rubber and gutta-percha with their structure. 5
   c) Elucidate the structure of menthol. 5
7. a) Define carotene and xanthophylls. Deficiency of vitamin A1 results night blindness, justify the statement with chemical point of view. 5
   b) How α-carotene differs from β-carotene? Describe the position of side chain in β-carotene. 5
8. a) Explain the biosynthesis pathway of cholesterol. 6
   b) What are steroid hormones? Explain the different types of sex hormones. 5
   c) Elaborate the spectral properties of steroids. 5
9. a) Write the structures of following compounds: 3

   (i) 3,4-seco-5α-cholestane
   (ii) 5,7α-cyclo-5β-cholestane-4α-ol
   (iii) Digitoxigenin

CIST

1 (a) Justify the statement "Biopharmaceutics is an important branch of pharmacy" (7)

(b) What is "Henderson Hasselbach eqn"? Describe briefly its importance in explaining the absorption of drugs from GIT & suitable e

2. (a) Derive the relation for the plasma conc^n for continuous IV dosing

(b) What is elimination? Characterize the kinetics of renal clearanc drugs (8)

3. (a) Define the pharmacokinetic terms $T_{1/2}$, V, AUC & A (7)

(b) Discuss briefly the key factors related to in vivo interactions of drugs & suitable examples. (8)

OR

A drug was given by multiple oral doses of 250 mg every 6 hrs. Assume a one compartmental linear model applies to this drug in this conc^n range. For this dosage form & a patient the bioavail is 0.70 & the absorption rate constant is 1.92/hr. The half life and V for this drug in the patient (60.0kg) are 4 hr & 0.85L/kg Calculate the average drug conc^n.

4(a) Discuss briefly the factors/process affecting the disposition of drug

(b) What is pharmacokinetics? Describe briefly any two key process & examples (8)

5. (a) Define the term bioequivalence. Write various factors which may affe absolute bioavailability of drugs.

(b) After the oral administration of 500mg of drug X, the following plasma co X were observed:

Time (hr)	0.5	1.0	1.5	2.0	3.0	6.0	8.0	10.0
Conc (mg/ml)	17.0	22.5	23.0	22.0	16.5	6.3	3.1	1.5

Calculate: elimination h absorption rate constant & ap volume of drug distributio

6(a) After the IV inj of antibiotics, the plasma conc^n was found to be 12.0 & 5.5 at 2 & 4 hours respectively, calculate the half life of antibiotics (7)

(b) Illustrate the influence of GI flora on the oral bioavailability of drugs Suitable examples (8)

(7) Write short notes on any two 5X2 = 10

a) Food & drug absorption

b) Pharmacokinetic Modeling

c) Saturation kinetics.

POKHARA UNIVERSITY

Level: Bachelor
Programme: BPharm
Course: Pharmacognosy II

Semester – Spring

Year : 2013
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

a. Explain briefly the electromagnetic spectrum. 5

b. Describe instrumentation of ultraviolet spectroscopy. 5

c. Write the part of electromagnetic spectrum with calculation in which EMR having wavelength 540nm falls. 5

a. The intensity of M^+ and M+2 peaks of Chlorine atoms are 3:1 while the intensity of M^+ and M+2 peak of Bromine atoms are 1: 1 why? 5

b. Describe the factors influencing vibrational frequencies. 5

c. Write down the fragmentation pattern of 4-heptanone in mass spectroscopy. 5

a. Calculate the vibrational frequency of the C-H stretching of alkane by using Hooke's law. [Given K=550 Nm^{-1}]. 5

b. Hydrogen bonded O-H_{str} appear at lower frequency than free O-H_{str} Explain this statement with suitable example 5

c. In each of the following pairs of bonds, select the one that stretches at the highest frequency with suitable reasons. 5

i. C—O or C==O
ii. C—O or C—Cl
iii. C==C or C==C
iv. C—C or C—O
v. C—H or O—H.

4. a. What do you mean by spin-spin coupling? Describe the factors that influence coupling constant. 5

b. Peak signals are inherently weaker in ^{13}C NMR than ^{1}H NMR. Justify the answer. 5

c. Predict the multiplicities of the signals in the proton (^{1}H) NMR spectra of: 5

i. 1, 1, 2-trichloroethane

ii. 1, 1 -dichloro, 2, 2-dibromoethane
iii. 1, 1-dichloroethane
iv. 2-bromobutane

5. a. Explain the applications of NMR spectroscopy in pharmaceutical field. 8

b. Unknown X has molecular formula $C_9H_{12}O$. The IR spectrum of compound A has important absorption bands at 1600, 1500, and 1100 cm^{-1}. The H^1 NMR spectrum of A is summarized as: 7

2.6 ppm, triplet, 2H;
3.3 ppm, singlet, 3H;
3.5 ppm, triplet, 2H;
7.1 ppm, singlet 5H.

Provide a structure for X based upon this data.

6. Give a brief account on:

a. Chromophore 5

b. Molecular vibration 5

c. Theory of NMR 5

7. Write short notes on **any two:** 2×

a. Basic principles of x-ray
b. GC-MS
c. Metastable ion

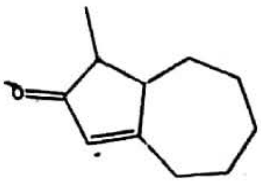
POKHARA UNIVERSITY

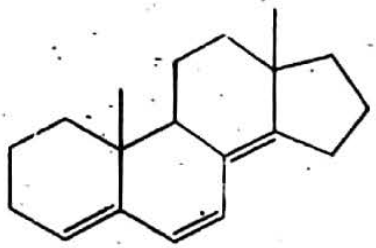
July 15, 2014

Level: Bachelor Semester – Fall Year : 2014
Programme: B. Pharm Full Marks: 100
Course: Pharmacognosy II Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

a. Describe electromagnetic spectrum. 5
b. Explain the electronic transition in UV- Spectroscopy. 5
c. Define cut-off wavelength. Discuss the role of solvent polarity on absorption of UV radiation. 5
a. Calculate λ_{max} for following structures using Woodward and Fieser rule. 5





b. Describe the principle and application of IR spectrophotometer. 5
c. What is interferogram? Explain with diagram. 5
a. What is *DEPT*? Mention its application? 5
b. Alkene protons appear at high frequency while alkyne protons appear at low frequency. Justify the answer. 5
c. Define ^1H-^1H *COSY* spectra with suitable example. 5
a. There are three isomeric ether with the molecular formula $C_4H_{10}O$: name them. State how many signals will arise in ^{13}C NMR spectrum of each. 5
b. Explain the nuclear overhauser effect (NOE) with suitable example. 5
c. Describe various method of ionization in mass spectrometry. 5
a. Describe basic principle and instrumentation of mass spectrometer. 8
b. Discuss the role of Mass spectroscopy in determination of isotopic abundances. 7

1

Write down the basic principle of generation of generation X-ray. 5

What is X-ray tube? How is it operated? 5

Describe the application of X-rays in structure determination of organic molecules. 5

ite short notes on **any two:** 2×5

a. Metastable ion

b. Heteronuclear coupling

c. Chemical shift

POKHARA UNIVERSITY

Semester – Fall

Year : 2014
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Level: Bachelor
Programme: B. Pharmacy
Course: Pharmacognosy III

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

a. Explain the principle of solid-liquid extraction. What do you know about Maceration, Digestion, Decoction and Percolation? Explain briefly. 8
b. What is screening? Mention the ideal requirements for bioactivity screening of organic natural products. 7
a. How can spectroscopic approach be combined with chemical approach for the structure elucidation of natural products? 5
b. Explain Nitrogen rule in mass spectroscopic technique with examples. 5
c. Explain the mevalonate pathway for the biosynthesis of isoprenoid compound. 5
a. Explain the biosynthesis of aromatic amino acids through shikimic acid pathway. 5
b. What are the precursors for the biosynthesis of protagladins? Discuss the biosynthesis of PGE3 from eicosapentanoic acid. 5
c. Define and classify fatty acids. 5
a. Discuss the stereochemistry of menthone and menthol. 5
b. Classify the monoterpenes on the basis of structural skeleton. Write in short about the special isoprene rule. 5
c. Explain the constitution of any one monoterpenoid. 5
a. Draw the structure of cholesterol with numbering and the chiral centers. Also explain the spectral properties of cholesterol. 8
b. Write the principle and instrumentation of gas chromatography. Summarize the types of detectors used in gas chromatography. 7
a. Elucidate the structure of β-carotene with pertinent chemistry. 5
b. How can you establish that the vitamin A is structurally half of the β-carotene? 5
c. Classify the steroid hormones. Explain the physiology of some male and female sex hormones. 5

Write short notes on **any two:** 2×5

a. **Proving of structure of the ring system for sterol.**
b. **Differences between Absorption Chromatography and Partition Chromatography**
c. **HPCE (High Performance Capillary Electrophoresis)**

POKHARA UNIVERSITY

Semester – Fall Year : 2015

Level: Bachelor Full Marks: 100

Programme: B. Pharm Pass Marks: 45

Course: Pharmacognosy IV (Natural Products Chemistry) Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

a. What is bioassay guided fractionation? Explain with example. 8

b. Explain random selection approach for the selection of plants for pharmacological screening. 7

a. What may be the possible reason in failing to obtain positive results with extract containing active principles in pharmacological screening? Elaborate with examples. 8

b. Write the structures, source and experimental or clinical data of any two anticancer alkaloids. 7

a. Mention various bioactive sesquiterpenoids with source, structure and biological uses. 7

b. List three semisynthetic derivatives of Lysergic acid and Erythromycin with structure and uses. 8

a. Describe different generations of cephalosporin. 8

b. Discuss about the biological activity of saponins from *Bupleuri radix* with respective examples. 7

a. Explain briefly the clonal propagation. 8

b. Write down the pharmacological actions of ergometrine and draw its structure. 7

a. What are plant growth regulators? Write about the chemistry, structures and physiological significance of Auxins. 8

b. Write the structures and pharmacological uses of Ergotoxine. 7

Write short notes on any two: 2×5

a. Rat Hippocratic screening

b. Amino-acid derived antibiotics

c. Quality control of crude drugs

POKHARA UNIVERSITY

July 16, 2018

Level: Bachelor Semester: Fall Year : 2015
Program: B.Pharm. Full Marks: 100
Course: Pharmacognosy III Pass Marks: 45
(Natural Products Chemistry) Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks

Attempt all the questions:

a) What is the importance of Natural Products in new drug discovery? Explain with examples. 8

b) Write down the difference between adsorption and partition chromatography with examples. 7

a) Give the principle of supercritical fluid extraction of natural product. Mention its advantages over conventional methods of extractions. 5

b) Elaborate the purification of protein by using ion-exchange chromatography. 5

c) Explain the role of NMR and Mass spectroscopy to elucidate the structure of natural product. 5

a) Show your familiarities on: 5
i) Effect of solvent in UV spectroscopy
ii) McLafferty rearrangement

) What are the functions of secondary metabolites in the host organism? Explain the different building blocks that are mostly encountered in producing the skeleton of secondary metabolite. 5

) Outline the biosynthetic pathways of different families of alkaloids.

) Write the structures of 5
i) Eicosatrienoic acid ($\Delta^{8, 11, 14}$)
ii) Arachidonic acid ($\Delta^{5, 8, 11, 14}$) and
iii) Eicosapentaenoic acid ($\Delta^{5, 8, 11, 14, 17}$)

) Outline the biosynthetic pathway of Fatty acid. 5

) Describe the constitutional analysis of menthol. 5

) Define isoprene rule. Explain the classification of terpenoids. 5

) Write the biosynthetic relationship among various monoterpenoids. 5

) Why β-carotene gives two molecule of vitamin A whereas γ-carotene gives only one molecule of vitamin A? Explain with their structures. 5

) What is visual cycle? Illustrate with the structures of retinoids. 7

) What are steroids? Explain the biosynthesis of cholesterol. 8

) What are sexual hormones? Classify them with one example of each.

Write short notes on **any two:** 2×5

) Counter Current Chromatography
) Activation of Vitamin-D
) Bile Acids

POKHARA UNIVERSITY

Sep 14, 2015

Semester: Fall

Year : 2015
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Level: Bachelor
Programme: B. Pharm.
Course: Pharmacognosy I (Medicinal Botany)

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions:

a) "Plants are still the important source of medicines" Justify the statement with examples.
b) Write down the characteristic features of family Liliaceae and Solanaceae.
a) Discuss about the pharmacologically important natural products studied over the last century.
b) What is herbarium? Write down the various process of herbarium preparation. Mention the scope of developing herbarium in pharmacognosy.
a) Explain physiological and commercial roles of Gibberellin.
b) Why is there can phytochemical variation within a species? Is it helpful or not? How can it be regulated?
a) How can Nepalese crude drugs be commercialized in the global market? Discuss your view.
b) Define adulteration of crude drugs. Describe the types of adulteration with suitable examples.
a) How can marine products be useful medicinal substances? Explain with examples.
b) Discuss biological sources, chemical constituents and uses of Siplican, Bojho and Amala.
a) Write about the identifying features and application of Kutki *or* Yarsagumba.
b) Discuss about the two Nepalese plants which produce essential oils.

Write short notes on **any two**: 5×2

a) Chemotaxonomy
b) Synergy in phytomedicines
c) Rajbriksha and Tatelo

POKHARA UNIVERSITY

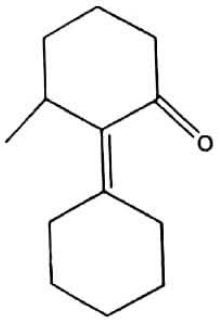
Level: Bachelor Semester: Fall Year : 2016
Programme: B.Pharm. Full Marks: 100
Course: Pharmacognosy II (Spectroscopy) Pass Marks:45
Time : 3hrs.

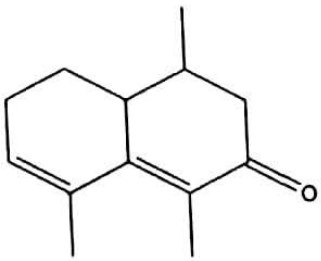
Candidates are required to give their answers in their own words as far as practicable.

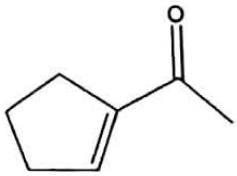
The figures in the margin indicate full marks.

Attempt all the questions:

1. a) Predict the λ_{max} for an absorption band in the UV-spectrum on the following compound dissolved in ethanol. 5

i) 

ii) 

iii) 

b) Describe the mode of vibration of carbondioxide in IR spectroscopy. 5

c) Calculate the wave number of stretching vibrations of a *carbon-carbon double bond*. Given force constant ($k=10 \times 10^5$ *dynes/cm*).

2. a) Write about the absorption law for the electronic spectroscopy? 2.5×10^{-4} M solution of a substance in a 1 cm. length cell at λ_{max}. 245 nm. has absorption 1.17. Calculate ε_{max} for this transition 5

b) Ethylene is colour less while β-carotene is orange in colour Justify. 5

c) Explain the effect of H-bonding and bond angle in vibrational frequency in IR spectrum. 5

3. a) Explain the different ionization technique chemical ionization, field desorption, fast atom bombardment in detail. 8

b) Describe the basic principle of mass spectroscopy. The intensity of M^+ and M+2 peaks of Chlorine atoms are 3:1 while the intensity of M^+ and M+2 peak of Bromine atoms are 1:1 why? 7

4. a) Clarify the principle and instrumentation of NMR spectroscopy. 7

b) Predict the number of signals, multiplicities and tentative chemical shift values in ^{1}H-NMR and ^{13}C-NMR spectra for the following compounds.

i) Methoxypropane

ii) 2-butanone

Also mention the equivalent protons on it.

5. a) Draw a DEPT, ^{1}H-^{1}H cosy and ^{1}H-^{13}C cosy spectra of propanol.

b) The ^{1}H NMR spectrum of a compound ($C_{14}H_{22}$) has two singlet at δ 1.1(9H) and 7.25 ppm (2H). The ^{13}C NMR spectrum shows four signal at δ 147, 125, 39.3 and 30.8 ppm. Suggest the structure for this compound.

6. a) Draw a diagram of Electromagnetic spectrum.

b) Draw a neat and labeled diagram of mass spectrometer.

c) Draw a neat and labled diagram of IR spectrometer.

7. Write short notes on **any two:**

a) McLafferty Rearrangement

b) Metastable ions

c) Application of X-ray spectroscopy in compound identification.

POKHARA UNIVERSITY

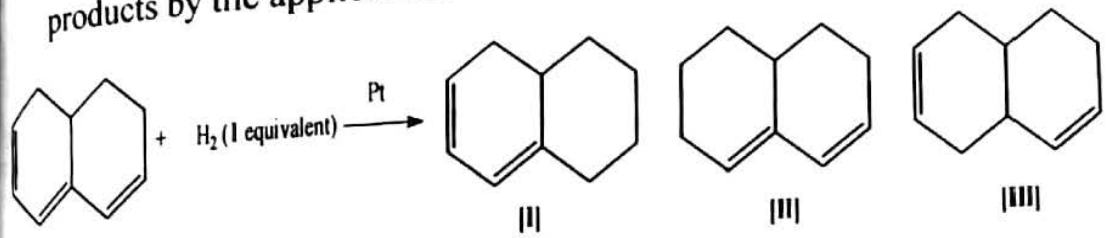
Semester: Fall

Level: Bachelor
Programme: B. Pharm.
Course: Pharmacognosy II (Spectroscopy)

Year : 2018
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Attempt all the questions.

a) The following triene on partial hydrogenation gives three products, which are separated by chromatography. How can you identify the products by the application of Woodward-Fieser rules: 5



b) Distinguished between the following pairs of compounds with the help of *IR-technique*; 5
   i) Ethanol and Dimethyl ether 5
   ii) ii) Propanal and Propanone
c) Explain the Instrumentation of *FTIR-Infrared* Spectrophotometer? 5
a) Describe the basic principle of Mass Spectroscopy? 5
b) How would you distinguished between Ethylamine, diethylamine and triethylamine on the basis of mass spectroscopy? 5
c) Describe the fragmentation pattern of 2-hexanone in m/e values - 43, 58, 85 in mass spectroscopy? 5
Q.No.3. See back. . .
a) Discuss the principle and application of NMR spectroscopy. 5
b) A organic compound having molecular formula $C_4H_{10}O$ shows following spectral information. 5
   - IR spectra: 1120cm^{-1}
   - ^{1}H NMR: 1.1 ppm (6H, duplet), 3.6ppm (1H, singlet) and 3.4ppm (3H, singlet)

   Determine the structure of compound.
c) Write the difference between dipolar and scalar coupling in NMR Spectroscopy. 5
a) Define DEPT with specific example. 5
b) Define HMBC and HMQC with example.

c) Describe the applications of X-ray for the determination of structure of compounds.

6. a) Draw a Net and labeled diagram of Mass spectrometry.

b) A $C_5H_{12}O_2$ compound has strong infrared absorption at 3300 to 3400 cm^{-1} The ^1H NMR spectrum has three singlets at δ 0.9 , δ 3.45 and δ3.2 ppm; relative areas 3:2:1. The ^{13}C NMR spectrum shows three signals all at higher field than 100 ppm. Suggest a structure for this compound.

c) A $C_9H_{10}O$ compound has a strong infrared absorption at 1720 cm^{-1}. Its ^1H NMR spectrum has signals at δ 2.8 (mult., 4H), 7.3 (s, 5H) and 9.8 (t, 1H) ppm. Its ^{13}C NMR spectrum shows seven lines at δ 200, 138, 129, 128, 125, 35 and 30 ppm. Suggest a structure for this compound.

7. Write short notes on **(any two):**

a) Mc lafferty Rearrangement

b) Solvent effect on UV spectroscopy

c) Chemical shift value

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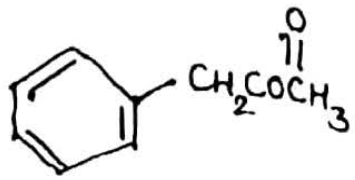
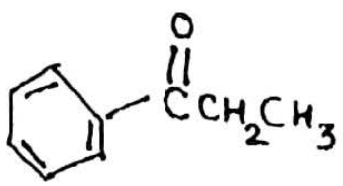
* 3(a) The multiplicities of the signal of CH_3 proton are triplet while CH_2 are quarter in the proton NMR-Spectra of Nitroethane. Describe with suitable reason.

3(b) Explain how IR and ^1H-NMR Spectroscopy could be used to distinguish between these two compounds. Be as specific as possible.





Also draw the tentative IR Spectra of above Compounds. (8)

POKHARA UNIVERSITY

Level: Bachelor Semester: Fall Year : 2018
Programme: B. Pharm. Full Marks: 100
Course: Pharmacognosy III Pass Marks: 45
(Natural Products Chemistry) Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

a) Give a brief outline on discovery of important drugs from natural products with examples. 8
b) Define Chromatography. Describe the principle, instrumentation and application of HPLC. 7

a) Explain general techniques of extraction of natural products. 8
b) Discuss role of different spectroscopic techniques in elucidation of structure of natural products. 7

a) Explain the biosynthetic pathway of aromatic amino acids via Shikimic acid pathway. 8
b) Explain the biosynthesis pathway of fatty acids. 7

a) Explain general method of determining structure of terpenoids with an example. 8
b) Classify terpenoids. Explain the stereochemistry of menthol and menthone. 7

a) Explain the biosynthesis of vitamin A1. 8
b) Classify carotenoids. How can you confirm the symmetrical structure of β-Carotene? 7

a) Starting from squalene, show biosynthetic pathway for ergosterol. 8
b) How can you explain the structures of different ring system in cholesterol? 7

Write short notes on **(any two):** 2×5

a) Prostaglandins
b) Gas chromatography
c) Steroid hormones

POKHARA UNIVERSITY

Semester: Fall

Level: Bachelor
Programme: B. Pharm.
Course: Pharmacognosy IV
(Natural Products Chemistry)

Year : 2018
Full Marks: 100
Pass Marks: 45
Time : 3hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

a) Describe the procedure for discovering new drugs from higher plants. 8
b) Explain various problems encountered in pharmacological screening. 7

a) Explain the process and requirements of multimensional primary screening of extracts. 8
b) Draw the structure of Taxol and mention its sources, uses and mechanism of action. 7

a) Describe different generations of cephalosporins with examples. 8
b) Explain the pharmacological properties of monoterpenes. 7

a) Define saponins. Explain the biological activities of saponins from *Glycyrrhiza glabra*. 8
b) Explain about phytochemical variations within a species. 7

a) List different quality control test parameters for determination of quality and standard of natural products. Explain any three of them in brief. 8
b) Write the structures and pharmacological activities of morphine and codeine. 7

a) Write down the source, structure and use of the following drugs. 8
   i. Ergometrine
   ii. Tetrahydrocannabinol
b) Discuss in brief about HTS in drug discovery with examples. 7

Write short notes on **(any two):** 2×5

a) Traditional plants as a source of new drugs.
b) Bioassay guided fractionation
c) Tetracyclines