

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[LL 951]

NOVEMBER 2017

Sub. Code: 2951

M.PHARM. DEGREE EXAMINATION
(PCI New regulations 2016)
SEMESTER-I
PHARMACEUTICAL ANALYSIS – MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL
TECHNIQUES

Q.P. Code : 262951

Time : Three hours

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain the theory and principle of Nuclear magnetic resonance.
b) Explain the terms equivalence of protons, chemical shift and coupling.
c) Draw the NMR spectrum expected for the compound 1, 3-dichloropropane. Indicate the equivalent protons, number of signals expected, relative positions of the signals and the splitting pattern of the signals.
2. a) Explain the principle of Mass Spectrometry.
b) Describe the working of a Mass Spectrometer.
c) Explain the McLafferty rearrangement.

II. Write notes on:

(7 x 5 = 35)

1. Heat Flux differential scanning calorimetry.
2. Rotating crystal method of studying crystal structures.
3. Factors affecting fluorescence.
4. Affinity chromatography.
5. Derivatisation techniques used in chromatography.
6. Ion selective glass electrodes.
7. Explain the finger print region and functional group regions in an IR spectrum.

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[LM 951]

MAY 2018

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M.PHARM. DEGREE EXAMINATION
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SEMESTER-I
PHARMACEUTICAL ANALYSIS – MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL
TECHNIQUES

Q.P. Code : 262951

Time : Three hours

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Discuss the different columns and detectors used in Gas chromatography.
b) Explain the terms Retention time and Retention volume.
c) Explain Head Space Analysis.
2. a) Explain the different methods of ionization employed in Mass Spectrometry.
b) Discuss the different methods of fragmentation.

II. Write notes on:

(7 x 5 = 35)

1. Different types of quenching.
2. Derivative spectroscopy.
3. Gel electrophoresis.
4. Differential Thermal analysis.
5. Draw the NMR spectrum expected for the compound Ethyl bromide, indicating the number of signals, their positions and the splitting of the signals. Justify the relative positions of the signals with respect to TMS.
6. Calculate the vibrational degrees of freedom for a linear molecule like carbon dioxide.
7. Explain the terms chemical shift and coupling.

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[LN 951]

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SEMESTER-I
PHARMACEUTICAL ANALYSIS – MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL
TECHNIQUES

Q.P. Code : 262951

Time : Three hours

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) What are the factors that influence vibrational frequencies? Explain.
b) What are the different modes of molecular vibrations? Discuss.
c) How many fundamental bands will be observed in the IR spectrum of benzene?
2. a) Explain the theory and principles of NMR spectroscopy.
b) What is meant by relaxation? Explain.
c) For the compound Butanone -2, what will be the number of signals, splitting of signals and position of the signals relative to TMS? Draw the spectrum.

II. Write notes on:

(7 x 5 = 35)

1. Factors affecting Thermogravimetric analysis.
2. X-ray powder diffraction technique.
3. Matrix Assisted Laser Desorption Ionisation (MALDI).
4. Height equivalent of a theoretical plate.
5. Ion exchange chromatography.
6. Homolytic cleavage in Mass Spectrometry.
7. Woodward fisher rule.

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[LO 951]

MAY 2019

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SEMESTER-I
PHARMACEUTICAL ANALYSIS – MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL
TECHNIQUES

Q.P. Code : 262951

Time : Three hours

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Write in detail on various principles of separation and chromatographic parameters of HPLC.
b) Calculate the Hydrogen deficiency for the compound C_6H_5COOH .
c) Discuss the 1H NMR signals of = Toluene.
2. a) Explain the types of ionization in Mass spectrometry. Draw and label single quadrupole mass instrument.
b) Write on peaks and application of Mass spectrometry.

II. Write notes on:

(7 x 5 = 35)

1. Write differential scanning calorimetric interpretation of two compounds.
2. Concepts of capillary electrophoresis.
3. With neat diagram give working of Katherometer and Electron capture detector.
4. Factors affecting vibration frequencies of IR spectra.
5. Write the principles of fluorimetry.
6. Write about elemental analysis by Flame emission spectroscopy.
7. Construction and working of a double beam spectrophotometer.

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[LP 951]

NOVEMBER 2019

Sub. Code: 2951

M.PHARM. DEGREE EXAMINATION
(PCI New regulations 2016)
SEMESTER-I
BRANCH III – PHARMACEUTICAL ANALYSIS – MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL
TECHNIQUES

Q.P. Code : 262951

Time : Three hours

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. Write on the principle, relaxation process, chemical shift and its factors affecting, coupling constant and applications of NMR spectroscopy.
2. a) Elaborate on principles, instrumentation and detection used in Gas chromatography.
b) Give the IR Interpretation for:
i) C_6H_5CHO ii) 2 – Hexene.

II. Write notes on:

(7 x 5 = 35)

1. Principles of analysis of drugs by UV absorption.
2. Biomolecular applications of gel chromatography.
3. Theory and types of fluorescence quenching.
4. Atomic absorption spectroscopy-principles and interferences.
5. Write on electrophoresis types.
6. Write about X-ray powder diffraction in structural analysis.
7. Describe the principles of TGA, DTA and DSC.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[LQ 0121]

JANUARY 2021

Sub. Code: 2951

(APRIL 2020 EXAM SESSION)

M.PHARMACY DEGREE EXAMINATION

SEMESTER-I (PCI New regulations 2016)

PHARMACEUTICAL ANALYSIS – MPA

PAPER I – MODERN PHARMACEUTICAL ANALYSIS

Q.P. Code : 262951

Time : Three hours

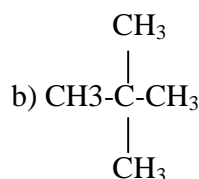
Answer ALL Questions

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Write the principle, diffraction methods and applications of X-ray diffraction analysis.
b) Write a note on moving boundary electrophoresis.
2. a) Explain the principle and instrumentation of AAS.
b) Indicate what NMR spectra you expect from the following compounds.



- c) Write the principle and instrumentation on Flame photometry.

II. Write notes on:

(7 x 5 = 35)

1. Explain about the relaxation process in NMR spectroscopy.
2. Write about the columns used in HPLC.
3. Write about the ions produced in Mass Spectroscopy.
4. Write a note on NMDR.
5. Write the ion collectors used in Mass Spectroscopy. Explain with a neat labeled diagram.
6. Isotopic peaks in Mass Spectroscopy.
7. Write the detectors used in HPLC. Explain about UV-Visible detector.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[MPHARM 0921]

**SEPTEMBER 2021
(OCTOBER 2020 EXAM SESSION)**

Sub. Code: 2951

**M.PHARMACY DEGREE EXAMINATION
SEMESTER-I (PCI New regulations 2016)
PHARMACEUTICAL ANALYSIS - MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES
*Q.P. Code : 262951***

Time : Three hours

Answer ALL Questions

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Write the instrumentation and solvent requirement in NMR spectroscopy.
b) Write a detailed note on ¹³C NMR.
c) Predict the number of peaks with relative intensity in the spectra of Toluene.
2. a) Write the principle and instrumentation involved in HPLC.
b) Discuss in detail about the developmental techniques and detection techniques in TLC.

II. Write notes on:

(7 x 5 = 35)

1. Explain the thermal transitions in DTA curve.
2. Write about the electronic transitions in UV spectroscopy.
3. Explain the sampling techniques in IR Spectroscopy.
4. Explain the theory of fluorescence with Jablonsky diagram.
5. Write a note on types of ion exchangers and the mechanism involved in ion exchange chromatography.
6. Write notes on any two mass analyzers.
7. Explain capillary electrophoresis.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[MPHARM 0122]

**JANUARY 2022
(APRIL 2021 EXAM SESSION)**

Sub. Code: 2951

**M.PHARMACY DEGREE EXAMINATION
SEMESTER-I (PCI New regulations 2016)
PHARMACEUTICAL ANALYSIS - MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES
*Q.P. Code : 262951***

Time : Three hours

Answer ALL Questions

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain different types of ionization techniques in Mass Spectrometry. Draw and label a single quadrupole mass instrument.
b) Discuss the Woodward Fieser rule and its application.
2. a) Discuss the theory of fluorescence and factors affecting fluorescence.
b) Write the instrumentation and applications of fluorimetry.

II. Write notes on:

(7 x 5 = 35)

1. Calculate the vibrational modes for linear molecule ethane C_2H_6 and nonlinear molecule C_6H_6 .
2. Differentiate dispersive I.R from F.T. IR.
3. Write short notes on Spin-Spin coupling.
4. Derive Beer lamberts law.
5. The molar absorption co-efficient of tyrosine in water is $1280 M^{-1} cm^{-1}$ at 280 nm. Calculate the concentration of tyrosine solution in water if the absorbance of the solution is 0.34 measured in a 1 cm path length cell.
6. Enumerate the detectors used in Gas chromatography. Explain any one in detail.
7. Write a note on Bragg's law.

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[MPHARM 0422]

**APRIL 2022
(OCTOBER 2021 EXAM SESSION)**

Sub. Code: 2951

**M.PHARMACY DEGREE EXAMINATION
SEMESTER-I (PCI New regulations 2016)
PHARMACEUTICAL ANALYSIS - MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES
*Q.P. Code : 262951***

Time : Three hours

Answer ALL Questions

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain the different modes of molecular vibrations in I.R .Spectroscopy.
b) Discuss the factors affecting vibrational frequencies in I.R.
c) Explain sample handling Techniques in IR Spectroscopy.
2. a) Draw a neat labeled diagram of Double beam UV spectrophotometer and explain construction and working.
b) Calculate the concentration of compound X using A (1%, 1cm) 9 at wavelength 257nm in a 1.5cm cell with absorbance 0.4527.

II. Write notes on:

(7 x 5 = 35)

1. Explain the different types of interferences in Flame photometry.
2. Write about capillary electrophoresis.
3. Write a short note on Coupling constants.
4. Enumerate the different ionization techniques used in mass spectrometry. Explain MALDI.
5. Explain the applications of HPLC.
6. Iso-electric focusing.
7. Predict the number of NMR peaks with relative intensity in the spectra of Acetaldehyde.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[M.PHARM 0922]

SEPTEMBER 2022
(APRIL 2022 EXAM SESSION)

Sub. Code: 2951

M.PHARMACY DEGREE EXAMINATION
SEMESTER - I (PCI New regulations 2016)
PHARMACEUTICAL ANALYSIS - MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Q.P. Code : 262951

Time : Three hours

Answer ALL Questions

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. (a) Describe the principle and working of HPLC with a neat labeled diagram.
(b) Calculate the concentration of compound X using A (1%, 1cm) ϵ at wave length 257nm, at a 1.5cm Cell, with absorbance 0.4527.
2. (a) With neat labeled diagram, explain the principle and instrumentation of Double beam UV Spectrophotometer.
(b) Write a note on ^{13}C NMR and spin-spin coupling.

II. Write notes on:

(7 x 5 = 35)

1. Write about the McLafferty rearrangement.
2. Write a note on any two mass analyzers.
3. Describe Bragg's law and applications of x-Ray diffraction.
4. Explain the sampling techniques in IR spectroscopy.
5. Give an IR interpretation for
(i) $\text{C}_6\text{H}_5\text{CHO}$ (ii) 2-butanone.
6. Discuss the factors affecting fluorescence.
7. Write a note on Electrophoresis techniques.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[M.PHARM 0423]

**APRIL 2023
(OCTOBER 2022 EXAM SESSION)**

Sub. Code: 2951

**M.PHARMACY DEGREE EXAMINATION
SEMESTER - I (PCI New regulations 2016)
PHARMACEUTICAL ANALYSIS - MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES**

Q.P. Code: 262951

Time : Three hours

Answer ALL Questions

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain in detail about the fragmentation rules in electron impact mass Spectrometry. Give suitable examples.
b) Explain different analysers used in mass spectroscopy.
2. a) Explain the principle and instrumentation of a spectrofluorimeter with a neat diagram.
b) Discuss the Woodward Feiser rule and its applications.

II. Write notes on:

(7 x 5 = 35)

1. Give the construction and working principle of Time of Flight Mass analyser.
2. Define the following with equations:
a) HETP b) Capacity factor c) Retention time.
3. Write the principle and working of flame emission spectrophotometer.
4. Differentiate dispersive IR and FT IR.
5. Discuss the factors affecting vibrational frequencies in IR.
6. Explain the applications of HPLC.
7. Explain the applications of NOESY and COSY.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[M.PHARM 0823]

AUGUST 2023
(APRIL 2023 EXAM SESSION)

Sub. Code: 2951

M.PHARMACY DEGREE EXAMINATION
SEMESTER - I (PCI New Regulations 2016)
PHARMACEUTICAL ANALYSIS - MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Q.P. Code: 262951

Time : Three hours

Answer ALL Questions

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

- What are the basic requirements for absorption of IR radiation? Explain with suitable examples.
 - Write an account on chromophores with suitable examples. Discuss the choice of Solvents and solvent effects in absorption.
- What do you mean by nuclear Overhauser effect (NOE)? What are its applications?
 - Explain the chemical shift data of the following compounds:
 - Benzene- C_6H_6 $\delta = 7.37$
 - Acetylene $-C_2H_2$ $\delta = 2.9$
 - Toluene $C_6H_5CH_3$ $\delta = 2.32$
 - Cyclohexane C_6H_{12} $\delta = 5.57$
 - Aniline $C_6H_5NH_2$ $\delta = 6.44$.

II. Write notes on:

(7 x 5 = 35)

- Discuss spin-spin coupling and factors affecting spin-spin coupling.
- Write about ion exchange chromatography.
- Define the following terms:
 - Accuracy
 - Precision
 - LOD
 - LOQ.
- Explain about factors affecting fluorescence intensity.
- Write about affinity chromatography and its applications.
- Write construction and working of Electron Capture Detector.
- Calculate the concentration of methyltestosterone in an ethanolic solution of which the absorbance in a 1 cm cell at its λ_{max} , 241nm, was found to be 0.890. The A (1%, 1cm) in the B.P.monograph of methyltestosterone is given as 540 at 241nm.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[M.PHARM 1223]

DECEMBER 2023
(OCTOBER 2023 EXAM SESSION)

Sub. Code: 2951

M.PHARMACY DEGREE EXAMINATION
SEMESTER - I (PCI New Regulations 2016)
PHARMACEUTICAL ANALYSIS - MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Q.P. Code: 262951

Time: Three hours

Answer ALL Questions

Maximum: 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain the principle, instrumentation, working and application of UV-Visible spectrophotometry.
b) Write about types electronic transitions in UV – spectroscopy.
2. a) Explain the theory of mass spectrometry.
b) Write the different types of ionisation technique in mass spectrometry.
c) Write about the time of flight mass analyzer.

II. Write notes on:

(7 x 5 = 35)

1. Write the different types of molecular vibration by absorption of IR radiation by molecules.
2. Write the interferences of flame photometry. How will you overcome that?
3. Write a note on spin – spin coupling.
4. Predict the structural formula for the compounds with the following molecular formulae showing only one PMR signal each.
a) C_8H_{18} b) C_2H_6O c) C_5H_{12}
5. How will you determine the crystal structure by Bragg's spectrometric method?
6. Explain factors affecting the intensity of fluorescence.
7. Write a note on Iso electric focusing electrophoresis.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[M.PHARM 0524]

MAY 2024
(APRIL 2024 EXAM SESSION)

Sub. Code: 2951

M.PHARMACY DEGREE EXAMINATION
SEMESTER - I (PCI New Regulations 2016)
PHARMACEUTICAL ANALYSIS - MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Q.P. Code: 262951

Time: Three hours

Answer ALL Questions

Maximum : 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain the different modes of molecular vibrations in IR Spectroscopy.
b) Discuss the factors affecting vibrational frequencies in IR.
c) Explain sample handling techniques in Spectroscopy.
2. a) Elaborate on the principle, instrumentation and detectors used in ion exchange chromatography.
b) Explain the different detection techniques used in Paper chromatography.

II. Write notes on:

(7 x 5 = 35)

1. Draw the NMR spectrum expected for the compound 1, 3 –dichloropropane. Indicate the equivalent protons, number of signals expected, relative positions of the signals and the splitting pattern of the signals.
2. Define Quenching. Explain the different types of quenching.
3. Explain any two ionization techniques in Mass spectrometry.
4. Write a note on Affinity chromatography.
5. Write a note on paper electrophoresis.
6. Explain the principle and instrumentation in power compensation DSC.
7. Describe the detectors used in UV spectroscopy.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[M.PHARM 0425]

APRIL 2025

Sub. Code: 2951

**M.PHARMACY DEGREE EXAMINATION
SEMESTER - I (PCI New Regulations 2016)
PHARMACEUTICAL ANALYSIS - MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES**

Q.P. Code: 262951

Time: Three hours

Answer ALL Questions

Maximum: 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Define Bragg's law. Add a note on different x-ray methods and applications of x-ray Diffraction.
b) Discuss types of crystals and Rotating crystal technique.
c) Write note on ion selective electrode in potentiometry.
2. a) Give the IR Interpretation for:
i) C_6H_5CHO ii) 2 - Hexene
b) Write in detail about principle, working mechanism and advantages of Quadrupole mass analyser.

II. Write notes on:

(7 x 5 = 35)

1. Discuss the factors affecting resolution in High Performance Liquid Chromatography.
2. Write note about mass fragmentation and its rules.
3. Write the principle and application of differential thermal analysis.
4. Write in detail about factors influencing chemical shift.
5. Write the advantages and disadvantages of Differential scanning calorimetry.
6. Write a short note on Coupling constants.
7. Write about the columns used in HPLC.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[M.PHARM 1025]

OCTOBER 2025

Sub. Code: 2951

M.PHARMACY DEGREE EXAMINATION
SEMESTER - I (PCI New Regulations 2016)
PHARMACEUTICAL ANALYSIS - MPA
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Q.P. Code: 262951

Time: Three hours

Answer ALL Questions

Maximum: 75 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain the principle and instrumentation of Atomic Absorption Spectroscopy.
b) Write note on various detectors used in IR spectrophotometer.
c) Give an account on the developmental techniques in TLC.
2. a) Describe the instrumentation and application of Spectrofluorimeter.
b) Outline the principle, instrumentation and applications of HPLC.

II. Write notes on:

(7 x 5 = 35)

1. Derive Beer Lambert's law. Write its limitations.
2. Discuss the IR interpretation of
 - a) $C_6H_5CH = CH - CHO$
 - b) $CH_3CH_2CH_2CH_2OH$
3. Explain the theory and modes of molecular vibrations in IR spectroscopy.
4. Discuss the principle, instrumentation and pharmaceutical applications of DTA.
5. Write about Chemical shift and spin-spin coupling.
6. Briefly explain the principle of Potentiometry. Discuss the applications of potentiometric Titrations.
7. Describe in detail about the interferences in Flame emission spectroscopy.
