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

[LL 941] NOVEMBER 2017 **Sub. Code: 2941**

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

Q.P. Code : 262941

Time : Three hours **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Explain in detail the theory and instrumentation of NMR spectrometer.

   b) Classify chromatographic methods based on mechanism of separation and add a note on column chromatography.

2. a) Explain the theory of Mass spectroscopy and add a note on matrix assisted laser desorption ionization mass spectroscopy.

   b) Discuss a detail account on factors affecting vibrational frequencies and calculate the vibrational degrees of freedom for benzene and carbon dioxide molecule.

II. Write notes on: **(7 x 5 = 35)**

1. Write a note on X- ray powder diffraction technique.
2. Give an account on principle and methodology of thermogravimetric analysis.
3. Describe stationary phases used in HPLC and GLC.
4. Explain the principle of electrophoresis and factors affecting separation.
5. Briefly explain the principle and working of potentiometer.
6. Discuss on quenching and factors affecting fluorescence intensity.
7. Write the comparison of flame emission and atomic absorption spectroscopy.

****

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

[LM 941] MAY 2018 **Sub. Code: 2941**

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

Q.P. Code : 262941

Time : Three hours **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Explain the various components and working principle of fluorescence Spectrophotometer.
   b) Give a detailed account on Ion selective electrodes.

2. a) State the important laws governing UV absorption and derive the mathematical expression for the combined laws.
   b) Explain the principle and Instrumentation of Heat flux DSC.
   c) How many NMR signals are expected in each of the following compounds?
      i) 2- butanone ii) α-bromopropanoic acid

II. Write notes on: **(7 x 5 = 35)**

1. Explain the theory and modes of molecular vibrations in IR spectroscopy.
2. Discuss about spin-spin coupling and coupling constant.
3. Briefly explain on affinity chromatography.
4. Describe the working of flame ionization detector and thermal conductivity detector.
5. Give a detail account on Fast Atom Bombardment.
6. Explain on capillary zone electrophoresis.
7. Calculate the concentration in mcg/ml of a solution of tryptophan (molecular weight 204.2) in 0.1M Hydrochloric acid, giving an absorbance at its wavelength maxima, 277nm, of 0.613 in a 4 cm cell. The molecular absorptivity at 277 nm is 5432.

****

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

[LN 941] NOVEMBER 2018 **Sub. Code: 2941**

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

Q.P. Code : 262941

Time : Three hours **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Explain the principle, instrumentation and pharmaceutical applications of Gas Chromatography.
   b) Describe how an Infrared spectra is systematically interpreted?
   c) Detail about the interferences Flame emission spectroscopy.
2. Explain IR vibrational frequencies for:

   i) $CH_3 - \overset{O}{\overset{\|}{C}} - CH_3$ (Acetone).

   ii) $CH \equiv C - CH_2 - C \equiv CH$ (1, 5 – Penta-di-yne)

II. Write notes on: **(7 x 5 = 35)**

1. Principle, Instrumentation and pharmaceutical applications of DTA.
2. Isoelectric focusing and Zone electrophoresis.
3. Give an account on the principle and interferences of Atomic absorption spectroscopy.
4. Write about Chemical shift and spin-spin coupling and add a note on the factors influencing them.
5. Principle and applications of Potentiometry.
6. Explain how the calibration techniques are adopted in GC.
7. Explain the terms: a) Quenching effect b) Coupling constant
   c) Meta stable peak d) Bragg's law.

****

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

[LO 941] MAY 2019 **Sub. Code: 2941**

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

Q.P. Code : 262941

Time : Three hours **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Instrumentation and application of Dispersive and Fourier IR Spectrophotometer.
   b) Write a note on the theory and working of Zone electrophoresis.
   c) What do you mean by Quadrapole analyzers of Mass spectroscopy?

2. a) Principle, instrumentation and application of NMR spectroscopy.
   b) Discuss the IR interpretation.
   i) Benzaldehyde ii) Acetaldehyde iii) $C_6H_5 – CH = CH_2$
   iv) P-Chloro phenol.

II. Write notes on: **(7 x 5 = 35)**

1. Describe the construction and working principle of photomultiplier tube and Argon ionization detector.
2. Write short notes on Affinity and Gel Chromatography.
3. Theory and applications of HPTLC.
4. Discuss about the importance of MALDI and ESI.
5. Detail about the principle and instrumentation of HPLC.
6. Statement, derivation and limitations of Beer Lambert's law.
7. Moving boundary electrophoresis – principle and application.

******

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

[LP 941] NOVEMBER 2019 **Sub. Code: 2941**

M.PHARM. DEGREE EXAMINATION
(PCI New regulations 2016)
SEMESTER-I
BRANCH II – PHARMACEUTICAL CHEMISTRY – MPC
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Q.P. Code : 262941

Time : Three hours **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) With the help of a neat sketch explain the various components and working principle of Mass Spectrometer.

   b) Give a detail note on deuterium exchange reactions and Nuclear Overhauser Effect.

2. a) Explain the principle and instrumentation of Gas Chromatography.

   b) Describe the various detectors used in UV-Visible spectrophotometer.

II. Write notes on: **(7 x 5 = 35)**

1. Give the construction, principle and operation of Total consumption burner and Hollow Cathode Lamp.
2. Explain the steps involved in the analysis of drugs using HPTLC.
3. How can you distinguish between two isomers of molecular formula, C_3H_6O using IR Spectroscopy?
4. Define electrophoresis, classify with examples and add a note on gel electrophoresis.
5. Briefly explain on origin and production of X- rays.
6. Explain the principle and application of potentiometric titrations.
7. Give an account on TG curve and its applications.

****

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

[LQ 0121] JANUARY 2021 Sub. Code: 2941

(APRIL 2020 EXAM SESSION)

M.PHARMACY DEGREE EXAMINATION

SEMESTER-I (PCI New regulations 2016)

PHARMACEUTICAL CHEMISTRY – MPC

PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

Q.P. Code : 262941

Time : Three hours **Answer ALL Questions** **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Explain with illustrations the working principle, instrumentation and applications of UV single beam spectrophotometer.
   b) Enumerate any two factors influencing the followings:
   i) Vibrational frequencies ii) Fluorescence
   iii) Band broadening in Chromatographic column iv) Resolution and
   v) Source of errors in Potentiometry.

2. a) Give the IR interpretation of following.
   i) $C_6H_5CH = CH - CHO$ (Cinnamaldehyde)
   ii) $CH_3 - \overset{O}{\overset{\|}{C}} - C_6H_5$ (Acetophenone)
   b) Discuss the ^1H NMR signals of
   i) Ethanol (CH_3CH_2OH)
   ii) Phenol (C_6H_5OH)

II. Write notes on: **(7 x 5 = 35)**

1. Principle, experimental parameters and applications of Differential thermal analysis.
2. Discuss about the detectors and sampling techniques in IR spectroscopy.
3. Write a brief account on the theory and applications of :
   a) Capillary electrophoresis and b) X-ray crystallography.
4. Compare and contrast of the followings:
   a) Normal and reverse phase chromatography
   b) Gradient and isocratic elution
5. Explain the production of X- rays and Bragg's Law.
6. Outline the salient features of NMR spectroscopy which are used in structural elucidation.
7. Give an account on Derivative spectroscopy.

****

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

[MPHARM 0921] SEPTEMBER 2021 Sub. Code: 2941
(OCTOBER 2020 EXAM SESSION)

M.PHARMACY DEGREE EXAMINATION
SEMESTER-I (PCI New regulations 2016)
PHARMACEUTICAL CHEMISTRY - MPC
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES
Q.P. Code : 262941

Time : Three hours **Answer ALL Questions** **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Principle, instrumentation and factors affecting results of thermal gravimetry analysis.
   b) Principle and application of Carbon-13 nuclear magnetic resonance spectroscopy.

2. a) Theory and sample handling in Infrared spectroscopy.
   b) Write a interpretation of Infrared spectrum of the following compounds
      i) 1-Hexane
      ii) 1- butanol

II. Write notes on: **(7 x 5 = 35)**

1. Instrumentation and application of spectroflourimetry.
2. Quantum Numbers and their role in Nuclear Magnetic Resonance spectroscopy.
3. Matrix Assisted Lasser Desorption Ionization (MALDI).
4. Write a note on ultra high performance liquid chromatography.
5. Boundary electrophoresis and isoelectric focusing.
6. Thermal transition in modulated Differential scanning calorimetry.
7. Solvent and solvent effect in ultraviolet spectroscopy.

****

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

[MPHARM 0422] APRIL 2022 Sub. Code: 2941
(OCTOBER 2021 EXAM SESSION)

M.PHARMACY DEGREE EXAMINATION
SEMESTER-I (PCI New regulations 2016)
PHARMACEUTICAL CHEMISTRY - MPC
PAPER I – MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES
Q.P. Code : 262941

Time : Three hours **Answer ALL Questions** **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Principle, instrumentation and factors affecting results of thermal gravimetry analysis.
   b) Principle and application of Carbon-13 nuclear magnetic resonance spectroscopy.
2. a) Theory and sample handling in Infrared spectroscopy.
   b) Write a interpretation of Infrared spectrum of the following compounds
      i) 1-Hexane
      ii) 1- butanol

II. Write notes on: **(7 x 5 = 35)**

1. Instrumentation and application of spectroflourimetry.
2. Quantum Numbers and their role in Nuclear Magnetic Resonance spectroscopy.
3. Matrix Assisted Laser Desorption Ionization (MALDI).
4. Note on ultra high performance liquid chromatography.
5. Boundary electrophoresis and isoelectric focusing.
6. Thermal transition in modulated Differential scanning calorimetry.
7. Solvent and solvent effect in ultraviolet spectroscopy.

****

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

[M.PHARM 0922] SEPTEMBER 2022 Sub. Code: 2941
(APRIL 2022 EXAM SESSION)

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

Q.P. Code : 262941

Time : Three hours **Answer ALL Questions** **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Explain the general Mass fragmentation and its rule for important organic compounds.
   b) Discuss in detail about GC-Derivatization.

2. a) Discuss ^{1}H NMR signals of the following.
   i) Acetophenone ii) Propanoic acid iii) Butanal iv) Benzyl alcohol.

   b) Explain the working principle and applications of the following:
   i) Paper electrophoresis ii) Power compensation DSC.

II. Write notes on: **(7 x 5 = 35)**

1. Discuss IR molecular vibrations and the factors affecting molecular vibrations in I.R.
2. Brief account on Quantum numbers and their role in NMR Spectrometry.
3. Discuss about Electronic transitions in UV-Visible Spectroscopy.
4. Write about different types of ion exchanger used in ion exchange chromatography.
5. Discuss on instrumentation of double beam spectro fluorimetry.
6. Write a note on TGA.
7. Write a note on rotating crystal technique.

******

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

[M.PHARM 0423] APRIL 2023 Sub. Code: 2941
(OCTOBER 2022 EXAM SESSION)

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

Q.P. Code: 262941

Time : Three hours **Answer ALL Questions** **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Write a detailed note on HPLC including principle, instrumentation and applications.
   b) Define the terms: Retention time, Retention Volume and HETP.

2. a) Discuss the following in NMR spectroscopy:
   i) Chemical shift ii) Coupling constant.

   b) Explain the working principle and applications of the following:
   i) Gel electrophoresis ii) DTA.

II. Write notes on: **(7 x 5 = 35)**

1. Discuss IR interpretation of the following:
   i) p-aminobenzoic acid ii) Ethyl benzene.
2. Brief account on C^{13} NMR.
3. Discuss the Beer Lambert's Law.
4. Write about different detecting methods used in Thin Layer chromatography.
5. Discuss the Jablonski diagram.
6. Write a note on working principle and applications of Affinity chromatography.
7. Write a note on Bragg's law and applications of X-ray crystallography.

******

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

[M.PHARM 0823] AUGUST 2023 Sub. Code: 2941
(APRIL 2023 EXAM SESSION)

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

Q.P. Code: 262941

Time : Three hours **Answer ALL Questions** **Maximum : 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Explain the principle, instrumentation and applications of NMR Spectroscopy.
   b) Discuss in detail about GC Columns.

2. a) Discuss IR interpretation of the following:
   i) Benzamide ii) 2-Hydroxybenzoic acid iii) Butanal iv) Benzyl alcohol.

   b) Discuss the following ionization methods in MS
   i) Chemical ionization ii) FAB.

   c) Explain the working principle and applications of Heat flux DSC.

II. Write notes on: **(7 x 5 = 35)**

1. Write a note on working principle of Time of Flight Mass Analyzer in Mass Spectroscopy.
2. Discuss about choice of solvents and its effect in UV-Visible Spectroscopy.
3. Write a brief account on the theory and applications of:
   a) Zone electrophoresis b) Thin Layer Chromatography.
4. Discuss on quenching and factors affecting fluorescence intensity.
5. Explain the working principle and applications of Atomic Absorption Spectroscopy.
6. Write a note on Derivative Differential Thermal Analysis (DDTA).
7. Write a note on X-ray powder diffraction technique.

******

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

[M.PHARM 1223] DECEMBER 2023 Sub. Code: 2941
(OCTOBER 2023 EXAM SESSION)

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

Q.P. Code: 262941

Time: Three hours **Answer ALL Questions** **Maximum: 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. Draw a neat labeled diagram of double beam UV spectrophotometer and explain the principle and Instrumentation involved in UV spectroscopy.

2. a) The Molecular formula of a compound is $C_{11}H_{16}$. In the NMR spectra of the compound, the ratio of step heights a: b: c is 8.8: 2.9: 3.8. Calculate the number of protons for a, b, c.
   b) Calculate the specific absorbance of the compound having a concentration of c=5 µg /ml and whose Absorbance A is =0.357 at the wavelength 257nm in a 1 cm cell.
   c) Write a detailed note on Gel chromatography.

II. Write notes on: **(7 x 5 = 35)**

1. Write a note on Derivative spectroscopy.
2. Discuss the applications and sources used in IR.
3. Give an account on the instrumentation of spectro fluorimeter.
4. Describe the theory involved in Flame Emission spectroscopy.
5. Write a note on Quadrapole Mass analyser.
6. Write about the different detection techniques used in TLC.
7. Give an account of moving boundary Electrophoresis.

******

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

[M.PHARM 0524] MAY 2024 Sub. Code: 2941
(APRIL 2024 EXAM SESSION)

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

Q.P. Code: 262941

Time Three hours **Answer ALL Questions** **Maximum: 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. (a) Explain the theory and instrumentation of Mass Spectroscopy.
   (b) Discuss the various ionization techniques in Mass Spectroscopy.

2. a) Explain the Principle, instrumentation and applications of Gas chromatography.
   b) Write a note on the factors affecting resolution.

II. Write notes on: **(7 x 5 = 35)**

1. Write about the detectors used in HPLC.
2. Write about the detection techniques in paper chromatography.
3. Define Fluorescence. Discuss the different electronic states in Fluorescence.
4. Write about potentiometric titrations and determination of end point by such tirations.
5. Write the principle and applications of TGA.
6. Explain the types of crystals in X-Ray crystallography.
7. Write about the sampling techniques in IR spectroscopy.

******

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

[M.PHARM 0425] **APRIL 2025** **Sub. Code: 2941**

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

Q.P. Code: 262941

Time Three hours **Answer ALL Questions** **Maximum: 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. a) Instrumentation and application of Dispersive and Fourier IR Spectrophotometer.
   b) Write a note on the theory and working of Zone electrophoresis.
   c) What do you mean by Quadrupole analyzers of Mass spectroscopy?

2. a) Principle, instrumentation and application Ion exchange chromatography.
   b) Discuss the IR interpretation.
   i) Benzaldehyde ii) Acetaldehyde iii) C6H5 – CH = CH2
   iv) P-Chloro phenol

II. Write notes on: **(7 x 5 = 35)**

1. Write notes on different interferences in Atomic Absorption Spectroscopy.
2. Explain the steps involved in the analysis of drugs using Gas Chromatography.
3. Compare and contrast of the followings:
   a) Normal and reverse phase chromatography.
   b) Gradient and isocratic elution.
4. Thermal transition in modulated Differential scanning calorimetry.
5. Define the terms: Retention time, Retention Volume and HETP.
6. Write a note on X-ray powder technique.
7. Explain the indicator electrodes.

******

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

[M.PHARM 1025] **OCTOBER 2025** **Sub. Code: 2941**

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

Q.P. Code: 262941

Time Three hours **Answer ALL Questions** **Maximum: 75 Marks**

I. Elaborate on: **(2 x 20 = 40)**

1. (a) Define Chemical shift and explain the factors affecting chemical shift.
   (b) Give a detail note on deuterium exchange reactions and Nuclear Overhauser Effect.

2. a) Explain the principle and instrumentation of HPLC.
   b) Describe the various detectors used in UV-Visible spectrophotometer.

II. Write notes on: **(7 x 5 = 35)**

1. Give the construction, principle and operation of Total consumption burner and Hollow Cathode Lamp.
2. Explain the steps involved in the analysis of drugs using HPTLC.
3. How can you distinguish between two isomers of molecular formula, C3H6O using IR Spectroscopy?
4. Explain the terms: a) Quenching effect b) Coupling constant
   c) Meta stable peak d) Bragg's law
5. Moving boundary electrophoresis – principle and application.
6. Write a note on X-ray crystallography.
7. Explain on capillary zone electrophoresis.

******