

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

[LM 955]

MAY 2018

Sub. Code: 2955

**M.PHARM. DEGREE EXAMINATION**  
**(PCI New regulations 2016)**  
**SEMESTER-II**  
**BRANCH-III – PHARMACEUTICAL ANALYSIS – MPA**  
**PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

*Q.P. Code :262955*

**Time : Three hours**

**Maximum : 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Explain the principle and instrumentation of Mass spectroscopy.  
b) Explain in detail with examples the fragmentation pattern of organic compounds by mass spectroscopy.
2. a) Discuss NOESY and COSY techniques.  
b) Explain the term “chemical shift” and describe the factors affecting it with the aid of suitable examples.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Briefly explain the principle and application of Nano liquid chromatography.
2. Discuss Enantiomer separations of pharmaceuticals in HPLC.
3. Write the principle and application of ion exchange chromatography.
4. Give an account of detectors used in Gas chromatography.
5. Discuss the working principle and application of HPTLC.
6. Explain the principle involved in size exclusion chromatography.
7. Explain the principle involved in Capillary electrophoresis.

\*\*\*\*\*

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

[LN 955]

NOVEMBER 2018

Sub. Code: 2955

**M.PHARM. DEGREE EXAMINATION**  
**(PCI New regulations 2016)**  
**SEMESTER-II**  
**BRANCH-III – PHARMACEUTICAL ANALYSIS – MPA**  
**PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

*Q.P. Code :262955*

**Time : Three hours**

**Maximum : 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Describe in detail about Size exclusion chromatography.  
b) Explain the principle and instrumentation of NMR.  
c) What are the different parameters involved in HPLC separation?
2. a) Elaborate the various ionization techniques in Mass spectrometry.  
b) Discuss the principle, instrumentation and applications of Supercritical fluid chromatography (SFC).  
c) What are the different factors influencing Chemical shift?

**II. Write notes on:**

**(7 x 5 = 35)**

1. Write a brief note on Coupling constant.
2. Outline the principle and methods involved in CE.
3. With a neat diagram, write briefly about Flame ionization detector (FID).
4. Describe in detail about LC-MS.
5. Explain about the various pumps used in HPLC.
6. Write short notes on Affinity chromatography and its applications.
7. Discuss in detail about  $^{13}\text{C}$ -NMR.

\*\*\*\*\*

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

[LO 955]

MAY 2019

Sub. Code: 2955

**M.PHARM. DEGREE EXAMINATION**  
**(PCI New regulations 2016)**  
**SEMESTER-II**  
**BRANCH-III – PHARMACEUTICAL ANALYSIS – MPA**  
**PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

*Q.P. Code :262955*

**Time : Three hours**

**Maximum : 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Write the principle of Gas Chromatography.  
b) Explain about the detectors used in Gas Chromatography.
2. a) Discuss in detail about LC-MS Hyphenation technique.  
b) Explain in detail about Quadrupole and Ion trap type of Mass Analysers.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Write the principle and quantization techniques of HPTLC.
2. Discuss NOESY techniques in NMR.
3. Explain different factors influencing chemical shift in NMR.
4. Write shortly about APPI mass fragmentation and its rules.
5. Discuss about the practical aspects of preparative HPLC.
6. Enumerate in detail about different types of injectors used in HPLC.
7. Write about head space sampling technique in Gas chromatography and its applications.

\*\*\*\*\*

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

[LP 955]

NOVEMBER 2019

Sub. Code: 2955

**M.PHARM. DEGREE EXAMINATION**  
**(PCI New regulations 2016)**  
**SEMESTER-II**  
**BRANCH-III – PHARMACEUTICAL ANALYSIS – MPA**  
**PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

*Q.P. Code : 262955*

**Time : Three hours**

**Maximum : 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Describe the principle, instrumentation and applications of High Performance Thin Layer Chromatography (HPTLC).  
b) Explain briefly about MALDI and FT-ICR.  
c) Write a detailed note on LC-NMR.
2. a) Discuss the principle and instrumentation of Mass spectrometry.  
b) Explain in detail about Ion exchange chromatography.  
c) Enumerate the various applications of HPLC.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Write short notes on Ion pair chromatography.
2. Give the construction and working of Quadrupole mass analyser.
3. Discuss the applications of NMR spectroscopy.
4. What are the different detectors used in HPLC?
5. Explain about HETP.
6. Give a detailed account on CE-MS.
7. Describe in detail about derivatization techniques in Gas chromatography.

\*\*\*\*\*

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

[LQ 0121]

**JANUARY 2021**

**Sub. Code: 2955**

**(APRIL 2020 EXAM SESSION)**

**M.PHARMACY DEGREE EXAMINATION**

**SEMESTER-II (PCI New regulations 2016)**

**PHARMACEUTICAL ANALYSIS – MPA**

**PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

***Q.P. Code : 262955***

**Time : Three hours**

**Answer ALL Questions**

**Maximum : 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Write the principle, instrumentation and application of Super Critical Fluid Chromatography.  
b) Explain the principle and instrumentation involved in Capillary Electrophoresis.
2. a) Explain the principle, theory and instrumentation of Mass Spectroscopy.  
b) Discuss about different types of peaks in Mass Spectroscopy.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Explain the principle of NMR.
2. Write about type of columns used in Gas Chromatography.
3. Explain about HETP.
4. Discuss COSY techniques in NMR.
5. Explain in detail about APCI in Mass Spectroscopy.
6. Write the principle, stationary phase and mobile phase used in Affinity Chromatography.
7. Write about the high performance liquid chromatography in Chiral Analysis and its applications.

\*\*\*\*\*

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

**[MPHARM 0921]**

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

**Sub. Code: 2955**

**M.PHARMACY DEGREE EXAMINATION  
SEMESTER-II (PCI New regulations 2016)  
PHARMACEUTICAL ANALYSIS - MPA  
PAPER I – ADVANCED INSTRUMENTAL ANALYSIS  
*Q.P. Code : 262955***

**Time : Three hours**

**Answer ALL Questions**

**Maximum : 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Explain the principle, instrumentation and application of gas chromatography.  
b) Derivatization techniques of gas chromatography.
2. a) Explain the principle, instrumentation and application of NMR spectroscopy.  
b) Discuss about Mass analyzers.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Write difference between  $^{13}\text{C}$ - NMR and  $^1\text{H}$ - NMR.
2. Discuss about LC-MS.
3. Explain the principle and application of nano liquid chromatography.
4. Write about crown ethers in capillary electrophoresis.
5. Explain the affinity chromatography.
6. Write the chiral separation in pharmaceuticals.
7. Gradient high performance liquid chromatography.

\*\*\*\*\*

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

**[MPHARM 0122]**

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

**Sub. Code: 2955**

**M.PHARMACY DEGREE EXAMINATION  
SEMESTER-II (PCI New regulations 2016)  
PHARMACEUTICAL ANALYSIS - MPA  
PAPER I – ADVANCED INSTRUMENTAL ANALYSIS  
*Q.P. Code : 262955***

**Time : Three hours**

**Answer ALL Questions**

**Maximum : 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Explain the principle, instrumentation and detectors of HPLC.  
b) Briefly outline the principles of FT-NMR with reference to <sup>13</sup>C-NMR.
2. a) Explain the principle, instrumentation and application of super critical fluid chromatography.  
b) Write the overview of capillary electrophoresis in pharmaceutical analysis

**II. Write notes on:**

**(7 x 5 = 35)**

1. Write the principle of 2D nuclear magnetic resonance.
2. Discuss the different types of ionization techniques in mass spectroscopy.
3. Explain the principle and application of ion pair chromatography.
4. Describe any two detectors used in gas chromatography.
5. Explain the size exclusion chromatography.
6. Write a brief note on coupling constant and chemical shift.
7. Write about practical aspects of preparative HPLC.

\*\*\*\*\*

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

**[M.PHARM 0922]**

**SEPTEMBER 2022  
(APRIL 2022 EXAM SESSION)**

**Sub. Code: 2955**

**M.PHARMACY DEGREE EXAMINATION  
SEMESTER - II (PCI New regulations 2016)  
PHARMACEUTICAL ANALYSIS - MPA  
PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

*Q.P. Code : 262955*

**Time : Three hours**

**Answer ALL Questions**

**Maximum : 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Outline the principle behind NMR spectroscopy. Elaborate on factors which influence chemical shift .  
b) Discuss NOESY techniques in NMR.  
c) Discuss in detail about <sup>13</sup>C-NMR.
2. a) Explain the working of Mass spectroscopy.  
b) Explain the Liquid Chromatography - Mass Spectroscopy LC-MS..  
c) Discuss in detail about FAB mass spectrometry.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Discuss the working principle and application of ion pair chromatography.
2. Write an account on pumps used in HPLC.
3. Discuss in detail about capillary electrophoresis CE characteristics.
4. Write a brief notes on ESI mass spectrometry.
5. List the applications of preparative HPLC.
6. Discuss in detail about MS/MS system mass spectrometry.
7. Write about the instrumentation of super critical fluid chromatography.

\*\*\*\*\*

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

**[M.PHARM 0823]**

**AUGUST 2023  
(APRIL 2023 EXAM SESSION)**

**Sub. Code: 2955**

**M.PHARMACY DEGREE EXAMINATION  
SEMESTER - II (PCI New Regulations 2016)  
PHARMACEUTICAL ANALYSIS - MPA  
PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

*Q.P. Code: 262955*

**Time : Three hours**

**Answer ALL Questions**

**Maximum : 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Write the principle, instrumentation and solvent used in NMR.  
b) Explain briefly about spin-spin and spin lattice relaxation process in NMR.
2. a) Discuss in detail Immobilized Polysaccharide CSP's and Enantiomer separations of pharmaceuticals in HPLC.  
b) Write the principles instrumentations and gradient technique in High Performance Liquid Chromatography.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Explain the principle of Ion Exchange Chromatography and types of resins used.
2. Write the principle and application of Super Critical Fluid Chromatography.
3. Write the applications of Mass Spectroscopy.
4. Explain about different types of detectors in Gas chromatography.
5. Discuss in detail about mass ESI technique in Mass Spectroscopy.
6. Write shortly about the method development and modes of Capillary Electrophoresis.
7. Discuss about the peak parameters of Gas Chromatography.

\*\*\*\*\*

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

**[M.PHARM 1223]**

**DECEMBER 2023  
(OCTOBER 2023 EXAM SESSION)**

**Sub. Code: 2955**

**M.PHARMACY DEGREE EXAMINATION  
SEMESTER - II (PCI New Regulations 2016)  
PHARMACEUTICAL ANALYSIS - MPA  
PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

*Q.P. Code: 262955*

**Time : Three hours**

**Answer ALL Questions**

**Maximum: 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Discuss in detail about preparative HPLC.  
b) Discuss the principle, instrumentation and application of ion pair chromatography.
2. a) Discuss in detail about CE MS Hyphenation.  
b) Briefly explain the method development in capillary electrophoresis CE.  
c) Discuss the principle and pharmaceutical application of super critical fluid chromatography.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Discuss in detail about FT NMR technique.
2. Give an account of detectors used in Gas chromatography.
3. Discuss about the applications of Ion exchange chromatography.
4. Discuss in detail about nano liquid chromatography.
5. Write a note on FT ICR mass spectrometry.
6. List the applications of NMR Spectroscopy.
7. Discuss chiral analysis of pharmaceutical in HPLC.

\*\*\*\*\*

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

**[M.PHARM 0524]**

**MAY 2024  
(APRIL 2024 EXAM SESSION)**

**Sub. Code: 2955**

**M.PHARMACY DEGREE EXAMINATION  
SEMESTER - II (PCI New Regulations 2016)  
PHARMACEUTICAL ANALYSIS - MPA  
PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

*Q.P. Code: 262955*

**Time: Three hours**

**Answer ALL Questions**

**Maximum: 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Describe the principle and instrumentation of mass spectroscopy.  
b) Summarize in detail the different mass spectrometry ionization methods.  
c) Write a note on Mass analysers.
2. a) Describe the principle and instrumentation HPLC.  
b) Briefly explain the principle and applications of super - critical fluid chromatography.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Describe the detectors that are utilized in gas chromatography.
2. Discuss in detail about FT-NMR technique.
3. Explain about the working and applications of HPTLC.
4. Describe the working and uses of nano-liquid chromatography.
5. Write a brief note on spin-spin coupling and spin-lattice relaxation processes.
6. Explain capillary electrophoresis.
7. Hyphenated techniques in Mass Spectroscopy.

\*\*\*\*\*

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

**[M.PHARM 0425]**

**APRIL 2025**

**Sub. Code: 2955**

**M.PHARMACY DEGREE EXAMINATION  
SEMESTER - II (PCI New Regulations 2016)  
PHARMACEUTICAL ANALYSIS - MPA  
PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

*Q.P. Code: 262955*

**Time: Three hours**

**Answer ALL Questions**

**Maximum: 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Describe in detail about Size exclusion chromatography.  
b) Explain the term “chemical shift” and describe the factors affecting it with suitable examples.
2. a) Describe the principle, instrumentation and applications of High Performance Thin Layer Chromatography.  
b) Explain shortly about MALDI and FT-ICR.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Write briefly about the chiral separation in pharmaceuticals.
2. Explain about the various pumps used in HPLC.
3. Explain in detail about Flame ionization detector and its applications.
4. Write in detail about the instrumentation of super critical fluid chromatography.
5. Discuss the different types of peaks in mass spectroscopy.
6. Explain in detail about LC-MS Hyphenation technique.
7. Write in detail about <sup>13</sup>C-NMR.

\*\*\*\*\*

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

**[M.PHARM 1025]**

**OCTOBER 2025**

**Sub. Code: 2955**

**M.PHARMACY DEGREE EXAMINATION  
SEMESTER - II (PCI New Regulations 2016)  
PHARMACEUTICAL ANALYSIS - MPA  
PAPER I – ADVANCED INSTRUMENTAL ANALYSIS**

*Q.P. Code: 262955*

**Time: Three hours**

**Answer ALL Questions**

**Maximum: 75 Marks**

**I. Elaborate on:**

**(2 x 20 = 40)**

1. a) Discuss the LC-MS Hyphenation procedure in detail.  
b) Explain ion trap and quadrupole types of mass analyzers.  
c) Summarize the various mass spectroscopy ionization procedures.
2. a) Discuss in detail about preparative HPLC.  
b) Discuss the role of high-performance liquid Chromatography in chiral analysis.  
c) Summarize the theory, equipment and uses of ion pair Chromatography.

**II. Write notes on:**

**(7 x 5 = 35)**

1. Summarize the features of capillary electrophoresis in detail.
2. Write a brief note on chemical shift and coupling constant.
3. Explain about pharmaceutical enantiomer separations using HPLC.
4. Discuss about COSY and NOESY methods.
5. Write about the principle of NMR spectroscopy and its application.
6. Give an in-depth overview of Fourier-transform ion cyclotron resonance and MALDI.
7. Provide an extensive description of gas chromatography derivatization procedures.

\*\*\*\*\*