

DOCTOR OF PHARMACY (PHARM. D) DEGREE EXAMINATION**THIRD YEAR****PAPER II – PHARMACEUTICAL ANALYSIS***Q.P. Code: 383814***Time: Three Hours****Maximum: 100 marks****Answer ALL questions in the same order.****I. Elaborate on :**

Pages (Max.)	Time (Max.)	Marks (Max.)
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|--|----|---------|----|
| 1. Explain the theory of polarography involving Ilkovic equation, dropping mercury electrode, current voltage curve, various current produced and its application in pharmacy. | 17 | 40 min. | 20 |
| 2. Describe the theory of UV absorption spectroscopy and laws governing, deviation of laws.
Draw the diagram of a double beam UV spectrometer and its application in single / multi component analysis. | 17 | 40 min. | 20 |

II. Write notes on :

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|--|---|---------|---|
| 1. Write on theory, carrier gases and stationary phases used in gas chromatography. | 4 | 10 min. | 6 |
| 2. Explicate the types of fluorescence quenching with examples and give the application of fluorimetry to pharmaceuticals. | 4 | 10 min. | 6 |
| 3. What are the reference and indicator electrodes used in potentiometric titrations. Explain construction, working and advantages of one electrode from each of the type. | 4 | 10 min. | 6 |
| 4. What are the basic components of a HPTLC instrument?
Explain the advantages and application of HPTLC in pharmacy. | 4 | 10 min. | 6 |
| 5. What are the vibrations occur in a molecule on IR absorption?
Give the elements of interpretation of an IR spectrum of a molecule. | 4 | 10 min. | 6 |
| 6. Explain the concepts of statistical quality control. | 4 | 10 min. | 6 |
| 7. What is conductometric titration? Explain them with suitable examples. | 4 | 10 min. | 6 |
| 8. Write on construction, working principle and advantages of a flame ionization detector used in gas chromatography. | 4 | 10 min. | 6 |
| 9. Explain the ion exchange mechanism and write on various factors affecting ion exchange process. | 4 | 10 min. | 6 |
| 10. Briefly write on the procedure of regulatory control. | 4 | 10 min. | 6 |

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Pages (Max.)	Time (Max.)	Marks (Max.)
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1. Explain the theory of IR absorption?

Draw and label IR spectrometer giving details on its components.

17	40 min.	20
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How is IR spectroscopy applied for qualitative and quantitative analysis of pharmaceuticals.

2. Write the theoretical aspects, indicator and reference

electrodes used, and measurement of pH, types of titrations

17	40 min.	20
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and end point detection and application of potentiometry.

II. Write notes on :

1. What are the fundamental laws governing UV absorption and why do molecules deviate from laws?

4	10 min.	6
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2. How does a good laboratory practice performed in an industry?

4	10 min.	6
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3. Elaborate on theory of fluorescence. How does a pharmaceutical compound estimated by fluorescence concept?

4	10 min.	6
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4. What are amperometric titrations? Add note on advantages and pharmaceutical applications of amperometric titrations.

4	10 min.	6
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5. Give note on monochromators and detectors used in UV spectrophotometers.

4	10 min.	6
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6. Draw and label a double beam spectrofluorimeter giving its advantage.

4	10 min.	6
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7. How does the Derivatization and temperature programming are used in gas chromatographic analysis.

4	10 min.	6
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8. Describe the polarographic principle and factors affecting polarographic measurements.

4	10 min.	6
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9. What are the differences between atomic absorption and flame emission spectroscopy?

4	10 min.	6
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10. Give the principle and application of NMR and ESR spectroscopy.

4	10 min.	6
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Pages (Max.)	Time (Max.)	Marks (Max.)
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|--|----|---------|----|
| 1. Explain the working with the help of a neat, labeled, schematic block diagram of a HPLC and describes its operational modalities briefly. Write the advantages and classification based on mode of separation of HPLC. | 17 | 40 min. | 20 |
| 2. Discuss the underlying principle of Atomic Absorption Spectrometry (AAS). Describe the various components that are essentially involved in double beam AAS with help of a schematic diagram. How do the following three types of interferences affect the atomic absorption spectroscopic methods (a) Spectral interferences (b) Chemical interferences (c) Ionisation interferences. | 17 | 40 min. | 20 |

II. Write notes on :

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|--|---|---------|---|
| 1. Express Beer-Lambert's Law. Write its limitation, application and deviation. | 4 | 10 min. | 6 |
| 2. a) Flame ionization detectors.
b) What are the various factors affect the separation of compounds in column chromatography. | 4 | 10 min. | 6 |
| 3. Discuss the typical conductrometric titration curves obtained in conductrometric method of analysis and examine them critically with appropriate examples . | 4 | 10 min. | 6 |
| 4. Write a note on: (a) Glass electrodes (b) Dropping Mercury Electrodes (DME). | 4 | 10 min. | 6 |
| 5. Spectrophometric titration. | 4 | 10 min. | 6 |
| 6. Sample handling in IR spectroscopy. | 4 | 10 min. | 6 |
| 7. What is Fluorescence? What are the various factors affecting the fluorescence intensity? | 4 | 10 min. | 6 |
| 8. What is mass spectrum? Write its principle and different type of ions produced in that. | 4 | 10 min. | 6 |
| 9. Write a note on DSC. | 4 | 10 min. | 6 |
| 10. What is validation? Give a brief account of validation of analytical methods. | 4 | 10 min. | 6 |

DOCTOR OF PHARMACY (PHARM. D) DEGREE EXAMINATION**THIRD YEAR****PAPER II – PHARMACEUTICAL ANALYSIS***Q.P. Code: 383814***Time: Three Hours****Maximum: 100 marks****Answer All questions****I. Elaborate on:****(2 x 20 = 40)**

1. Explain the working and components of gas chromatograph with help of a neat, labeled, schematic block diagram. Write a note on classification, principle, factors influencing the separation and criteria to perform the Gas chromatography.
2. a) Draw an UV-Visible double beam spectrophotometer with a neat, labeled, block diagram and explain its each component operational mode.
b) Why a double beam spectrophotometer gives more precise, reliable and reproducible results in comparison to a single beam spectrophotometer?
c) What are the factors influencing the absorption of radiant energy?

II. Write notes on:**(10 x 6 = 60)**

1. Give a brief and comprehensive account of application of conductometry?
2. State Beer-Lambert's law. Derive it Write its application, deviation and limitation.
3. Discuss the underlying principle and interference of atomic absorption spectrometry.
4. Name the detectors used in HPLC. Discuss any one of them.
5. Differentiate validation and calibration. Give a brief account of validation of analytical methods.
6. Explain the theory and procedure of DSC.
7. Discuss the fundamental theory of mass spectroscopy.
What are the different ions produced in mass spectrum?
8. What is quenching? What are different type of quenching?
Write a note on factors affecting the fluorescence intensity.
9. Explain the various method of sample handling in IR-Spectroscopy.
10. Give a brief account of :
a) Indicator electrode, b) Polarizable electrode, c) Spectrophotometric titration.

DOCTOR OF PHARMACY (PHARM. D) DEGREE EXAMINATION

THIRD YEAR

PAPER II – PHARMACEUTICAL ANALYSIS

Q.P. Code: 383814

Time: Three Hours

Maximum: 70 marks

Answer All questions

I. Elaborate on:

(2 x 20 = 40)

1. a) Explain the different electronic transitions involved in UV spectrophotometry with examples.
b) Describe the theory and instrumentation of DSC.
2. a) Explain the principle and instrumentation of IR spectroscopy with a neat diagram.
b) Describe the theory and instrumentation of atomic absorption spectrometry.

II. Write notes on:

(10 x 3 = 30)

1. Write a brief note on theoretical aspects of mass spectra.
2. Give a brief account on ICH guidelines.
3. What is ion-exchange chromatography?
List the different types of ion exchange resins used in ion-exchange chromatography.
4. List the detectors used in GLC.
Explain the principle of any one.
5. What is plane polarized light?
Define optical rotatory dispersion and circular dichroism.
6. Explain any three factors affecting the fluorescence intensity.
7. Explain the working principle of hydrogen electrode with a neat diagram.
8. Write a brief note on conductometric titrations.
9. Write a note on chemical shift.
10. Explain briefly the applications of flame photometry.

DOCTOR OF PHARMACY (PHARM. D) DEGREE EXAMINATION

THIRD YEAR

PAPER II – PHARMACEUTICAL ANALYSIS

Q.P. Code: 383814

Time: Three Hours

Maximum: 70 marks

Answer All questions

I. Elaborate on:

(2 x 20 = 40)

1. a) With a neat labeled diagram, explain the principle and instrumentation of HPLC.
b) Write principle, stationary phase, mobile phase, development techniques and applications of paper chromatography.
2. a) Describe the theory of IR absorption.
With a neat labeled diagram, explain the instrumentation of IR spectroscopy.
Explain its applications in qualitative analysis of pharmaceuticals.
b) Write the principle involved in NMR and Mass spectroscopy.

II. Write notes on:

(10 x 3= 30)

1. Define chromophore, auxochrome and hypsochromic shift.
2. Write the applications of DSC and DTA in Pharmaceutical Analysis.
3. Define GLP, ICH and Validation.
4. What is base peak? List the different types ions produced in mass spectra.
5. List at least three differences between TLC and HPTLC.
6. Discuss briefly about ESR and its application.
7. Write the differences between flame emission and atomic absorption spectroscopy.
8. Define electrode potential. Give example of reference and indicator electrode used in potentiometry.
9. What do you know about dropping mercury electrode?
Give any two advantages and disadvantages.
10. Write a brief note on quenching.

[LF 814]

OCTOBER 2014

Sub. Code: 3814

PHARM. D DEGREE EXAMINATION
(2009-2010 Regulation)
THIRD YEAR
PAPER II – PHARMACEUTICAL ANALYSIS

Q.P. Code : 383814

Time : Three hours

Maximum : 70 marks

I. Elaborate on :

(4 x 10 = 40)

1. Explain the working principle and instrumentation of double beam UV-Vis spectrophotometer with a neat diagram.
2. Describe the principle, various stationary and mobile phases used, development and detection techniques of TLC.
3. What is electrophoresis? Explain the principle, instrumentation and applications of gel electrophoresis.
4. Explain the principle and various types of interferences that are encountered while performing analysis with flame emission spectroscopy.

II. Write notes on :

(6 x 5 = 30)

1. Elaborate on the theory of fluorescence. Explain how it can be used for quantification of pharmaceutical compounds.
2. Explain the various sources and detectors used in IR spectroscopy.
3. Write a note on the theoretical aspects of NMR and ESR.
4. Explain the principle and instrumentation of polarimeter.
5. Write a note on DME and Ilkovic equation.
6. Define R_f value, retention time, HETP, Bathochromic shift and quenching.

DOCTOR OF PHARMACY (PHARM. D) DEGREE EXAMINATION

(2009-2010 Regulation)

THIRD YEAR

PAPER II – PHARMACEUTICAL ANALYSIS

Q.P. Code: 383814

Time: Three Hours

Maximum: 70 marks

Answer All questions

I. Elaborate on:

(4 x 10 = 40)

1. With a neat labeled diagram, discuss the principle and various components of IR spectroscopy.
2. Write the principle and various carrier gases used in GLC.
Explain working principle of any two detectors used in GLC with a neat labeled diagram.
3. Explain the principle and instrumentation of spectrofluorimeter with a neat diagram.
4. Write the theoretical aspects, indicator and reference electrodes used, methods of detecting end point in potentiometry.

II. Write notes on:

(6 x 5 = 30)

1. State and explain fundamental laws of absorption.
Write its deviations and reasons for the deviations.
2. What are amperometric titrations?
Add a note on advantages and applications of amperometric titrations.
3. Write a note on DTA.
4. What is validation? Give a brief account of validation of analytical methods.
5. Describe the principle and various types of ion exchange resins used in ion exchange chromatography.
6. Explain the principle involved in mass spectroscopy.
List the various types of ions produced in mass spectrum.

[LH 814]

OCTOBER 2015

Sub. Code: 3814

PHARM. D DEGREE EXAMINATION

(2009-2010 Regulation)

THIRD YEAR

PAPER II – PHARMACEUTICAL ANALYSIS

Q.P. Code : 383814

Time: Three Hours

Maximum: 70 marks

Answer ALL questions

I. Elaborate on :

(4 x 10 = 40)

1. With a neat labeled diagram, explain the working principle and instrumentation of HPLC.
2. Explain the principle and instrumentation of AAS.
3. Write in detail the theoretical aspects and applications of NMR.
4. What is thermal analysis? Explain the principle and instrumentation of DSC.

II. Write notes on :

(6 x 5 = 30)

1. Explain in detail the various factors affecting fluorescence.
2. Write a note on monochromator and detectors used in UV spectrophotometer.
3. Describe the principle and applications of X-ray diffraction.
4. What are the basic components of HPTLC? Write the advantages and applications of HPTLC.
5. Write a note on optical rotator dispersion and circular dichroism.
6. Explain the various sample handling techniques adopted in IR spectroscopy.

[LI 814]

APRIL 2016

Sub. Code: 3814

PHARM. D DEGREE EXAMINATION
(2009-2010 Regulation)
THIRD YEAR
PAPER II – PHARMACEUTICAL ANALYSIS

Q.P. Code: 383814

Time : Three hours

Maximum : 70 Marks

I. Elaborate on:

(4 x 10 = 40)

1. Describe the theory and instrumentation of Flame Photometry.
2. Explain the electronic transitions in UV Spectroscopy.
3. Write the principle in Ion exchange Chromatography and the types of Ion exchange Resin.
4. Explain the theory and factors affecting Fluorescent intensity.

II. Write notes on :

(6 x 5 = 30)

1. Write a note on sample handling techniques in IR.
2. With neat labeled diagram, explain any two GC detectors.
3. Write short notes on Chromophores and Auxochromes.
4. Explain the theory of Gel Filtration Chromatography.
5. Write briefly about ICH guidelines.
6. What is Electrode Potential? Write about reference and indicator Electrode.

[LJ 814]

OCTOBER 2016

Sub. Code: 3814

PHARM. D DEGREE EXAMINATION
(2009-2010 Regulation)
THIRD YEAR
PAPER II – PHARMACEUTICAL ANALYSIS

Q.P. Code : 383814

Time : Three hours

Maximum : 70 Marks

I. Elaborate on:

(4 x 10 = 40)

1. Describe the theory and instrumentation of Mass Spectroscopy.
2. What are the sources and types of molecular vibration in IR?
3. What is Chemical Shift and write the factors affecting Chemical Shift.
4. a) Write the preparation of TLC plate, and development techniques in TLC.
b) Write a note on HPTLC.

II. Write notes on:

(6 x 5 = 30)

1. Explain the theory of Gel Electrophoresis.
2. Define Beers and Lamberts law and derive the equation.
3. Derive Bragg's law and write its significance.
4. What are the different types of currents in Polarography?
5. Write brief about ISO 9000.
6. Write about the detection techniques in paper Chromatography.

[LK 814]

MAY 2017

Sub. Code: 3814

PHARM. D DEGREE EXAMINATION
(2009-2010 Regulation)
THIRD YEAR
PAPER II – PHARMACEUTICAL ANALYSIS

Q.P. Code : 383814

Time : Three hours

Maximum : 70 Marks

I. Elaborate on:

(4 x 10 = 40)

1. Explain the principle and instrumentation of Infrared Spectrophotometer with a neat diagram.
2. Describe the principle and various components of AAS with a neat diagram.
3. Explain the principle and instrumentation of Spectrofluorimeter with a neat diagram.
4. What is Electrode Potential? Describe the construction and working of hydrogen electrode and glass electrode.

II. Write notes on:

(6 x 5 = 30)

1. Write short notes on the various factors affecting the Fluorescence intensity.
2. Explain the principle and applications of Ion exchange Chromatography.
3. Write a note on the theoretical aspects of NMR and ESR.
4. Explain the following terms:
a) Chromophore b) Blue shift c) R_f value
5. Explain the various development techniques and applications of paper Chromatography.
6. Write brief note on Conductometric titrations.

[LL 814]

OCTOBER 2017

Sub. Code: 3814

PHARM. D DEGREE EXAMINATION
(2009-2010 Regulation)
THIRD YEAR
PAPER II – PHARMACEUTICAL ANALYSIS

Q.P. Code : 383814

Time : Three hours

Maximum : 70 Marks

I. Elaborate on:

(4 x 10 = 40)

1. Describe the principle instrumentation and application of the gas chromatography with neat diagram.
2. Explain the principle involved in fluorimetric analysis. What is fluorescence quenching? Explain different types quenching with examples.
3. Compare the principles involved, common features and differences in the techniques of thin layer chromatography and paper chromatography.
4. Explain the current voltage curve and various currents in polarographic measurements.

II. Write notes on:

(6 x 5 = 30)

1. What are different regions of the Infrared spectrum? Explain various types of stretching and bending vibrations.
2. What are the different types of ion exchange resins used in ion exchange chromatography?
3. Explain the conductometric titrations with examples.
4. Give Bragg's equation and pharmaceutical applications in X-ray diffraction technique.
5. Write shortly on differential thermal analysis.
6. Explain the different detectors used in Ultra-violet visible spectrophotometer.

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

[LM 814]

MAY 2018

Sub. Code: 3814

**PHARM. D DEGREE EXAMINATION
(2009-2010 Regulation)
THIRD YEAR
PAPER II – PHARMACEUTICAL ANALYSIS**

Q.P. Code: 383814

Time : Three hours

Maximum : 70 Marks

I. Elaborate on:

(4 x 10 = 40)

1. Describe the theory and instrumentation of Flame Photometry.
2. What is thermal analysis? Explain the principle and instrumentation of DSC.
3. Write principle, stationary phase, mobile phase, development techniques and applications of paper chromatography.
4. Explain the different electronic transitions involved in UV spectrophotometry with examples.

II. Write notes on:

(6 x 5 = 30)

1. Write a note on DME and Ilkovic equation.
2. Explain the various sources and detectors used in IR spectroscopy.
3. Classify ion exchange resins basing on their structure.
4. Write a note on optical rotator dispersion and circular dichroism.
5. Explain the theory of Gel Filtration Chromatography.
6. What is validation? Give a brief account of validation of analytical method development.

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

[LN 814]

OCTOBER 2018

Sub. Code: 3814

**PHARM. D DEGREE EXAMINATION
(2009-2010 Regulation)
THIRD YEAR
PAPER II – PHARMACEUTICAL ANALYSIS**

Q.P. Code: 383814

Time : Three hours

Maximum : 70 Marks

I. Elaborate on:

(4 x 10 = 40)

1. Describe the theory of UV absorption spectroscopy and laws governing the deviation of laws.
2. Describe ICH guidelines in detail.
3. Discuss the underlying principle of Atomic Emission Spectrometry (AES). Describe the various components that are essentially involved in AES instrumentation with the help of a schematic diagram.
4. Write principle, stationary phase, mobile phase, development techniques and applications of thin layer chromatography.

II. Write notes on:

(6 x 5 = 30)

1. What do you know about rotating platinum electrode? Give any two advantages and disadvantages.
2. What is luminescence and its types?
3. What are the basic components of a HPTLC instrument? Explain the advantages and application of HPTLC in pharmacy.
4. Write on construction, working principle and advantages of a flame ionization detector used in gas chromatography.
5. Describe the polarographic principle and factors affecting polarographic measurements.
6. Give the applications of NMR and ESR spectroscopy.

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

[LO 814]

MAY 2019

Sub. Code: 3814

**PHARM. D DEGREE EXAMINATION
(2009-2010 Regulation)
THIRD YEAR
PAPER II – PHARMACEUTICAL ANALYSIS**

Q.P. Code: 383814

Time : Three hours

Maximum : 70 Marks

I. Elaborate on:

(4 x 10 = 40)

1. With a neat schematic diagram, explain the types of Pumps, Solvent Degassing system and detectors of HPLC.
2. What is electrophoresis? Explain the various methods of paper electrophoresis.
3. Explain the principle of liquid-liquid partition chromatography and write about the detection techniques in TLC.
4. State Beer's and Lambert's law. Explain the effect of solvent on absorption spectra. Define Auxochrome and hypsochromic shift.

II. Write notes on:

(6 x 5 = 30)

1. What are the differences between atomic absorption and flame emission spectroscopy?
2. Write the theory of NMR Spectroscopy.
3. What is group frequency and finger print region in IR Spectroscopy?
4. What is quenching? Write about the different types of quenching?
5. Distinguish between polarography and amperometry.
6. Explain the principle and instrumentation of polarimeter.

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

[LP 814]

OCTOBER 2019

Sub. Code: 3814

**PHARM. D DEGREE EXAMINATION
(2009-2010 Regulation)
THIRD YEAR
PAPER II – PHARMACEUTICAL ANALYSIS**

Q.P. Code: 383814

Time : Three hours

Maximum : 70 Marks

I. Elaborate on:

(4 x 10 = 40)

1. Explain the construction and working principle of Spectro fluorimeter.
2. Give an account of theory and applications of X-ray diffraction technique.
3. Explain in detail about ion exchange chromatography.
4. What is thermal analysis? Explain the principle and instrumentation of DSC.

II. Write notes on:

(6 x 5 = 30)

1. Write briefly on chemical shift in NMR.
2. What are all the validation parameters performed during method development?
3. Write the interference produced in flame photometer. How will you overcome this problem?
4. What are the factors affecting electrical conductivity in solution?
5. Describe the various types of vibration in IR.
6. Write the reason for deviation of Beer's law.
