राष्ट्रसंत तुकडोजी महाराज नागपूर विद्यापीठ

(सेंट्रल प्रोव्हिन्सेस शासन शिक्षण विभागाची अधिसूचना क्रमांक ५१३ दिनांक १ ऑगस्ट, १९२३ द्वारा स्थापित व
महाराष्ट्र सार्वजनिक विद्यापीठ अधिनियम, २०१६ (सन २०१७ चा महाराष्ट्र विद्यापीठ अधिनियम, कमांक ६) द्वारा संचालित राज्य विद्यापीठ)

(विद्या विभाग)

राष्ट्रसंत तुकडोजी महाराज नागपूर विद्यापीठ जमनालाल बजाज प्रशासकिय भवन महात्मा जोतिबा फुले शैक्षणिक परिसर, विद्यापीठ कॅम्पस चौक ते अंबाझरी टी–पॉइंट मार्ग, नागपूर – ४४० ०३३.

क्र. रातुमनावि/विद्या/२०/३४८ दिनांक २८/११/२०२०

:: अधिसूचना ::

सर्व संबंधीतांच्या माहितीकरीता सुचित करण्यात येते की, विज्ञान व तंत्रज्ञान विद्याशाखेअंतर्गत येणारे एम.फार्म. अभ्यासक्रमांत Modern Analytical Techniques (MAT) या अभ्यासक्रमीकेस औषधिनिर्माणशास्त्र अभ्यासमंडळांनी दिनांक ०४.१०.२०१९ रोजी संपन्न झालेल्या सभेत सदर अभ्यासक्रमिका तयार करून विद्याशाखेकडे शिफारशीत केली होती. सदर अभ्यासक्रमिकेस विज्ञान व तंत्रज्ञान विद्याशाखेने दिनांक **३० डिसेंबर,** २०१९ रोजी संपन्न झालेल्या सभेत मान्यता दिली तसेच दिनांक २९.१०.२०२० रोजी संपन्न झालेल्या विद्यापरीषदेने **प्रस्ताव क.** ४८ नुसार मान्यता प्रदान केलेली आहे. करिता सदर अभ्यासक्रमीका सत्र २०२०–२०२१ पासुन पुढे लागु करावयाची असल्याने सदर अधिसुचना निर्गमित करण्यात येत असून कृपया याची संबंधितांनी नोंद घ्यावी.

(टिप:– उपरोक्त अभ्यासक्रमिका विद्यापीठाच्या,(www.nagpuruniversity.ac.in) या संकेतस्थळावर उपलब्ध आहे.

कृपया संबंधीतानी नोंद घ्यावी

मा.कुलगुरूंच्या आदेशान्वये

(डॉ. निरज खटी)
कुलसचिव(अति.प्रभार)

प्रतिलिपी माहिती व पुढील कार्यवाहीसाठी अग्रेषित:

१. औषधिनिर्माणशास्त्र महाविद्यालयाचे सर्व प्राचार्य व विभागप्रमुख
२. मा. अधिष्ठाता, विज्ञान व तंत्रज्ञान विद्याशाखा
३. औषधीनिर्माणशास्त्र अभ्यासमंडळ सदस्य
४. मा. संचालक, परिक्षा व मूल्यमापन मंडळ
५. उपकुलसचिव (परिक्षा,पुर्व व परिक्षा उपरांत),
६. सहायक कुलसचिव (गोपनीय),
७. सहायक कुलसचिव (व्यावसायीक परिक्षा)
८. अधिक्षक (निकाल विभाग),
९. उपकुलसचिव मा. कुलगुरुंचे कार्यालय
१०. स्वीय सहाय्यक, मा. प्र– कुलगुरूंचे कार्यालय
११. डॉ. विणा प्रकाशे, माहितीशास्त्रज्ञ,

राष्ट्रसंत तुकडोजी महाराज
नागपूर विद्यापीठ, नागपूर.

(डॉ.अनिल हिरेखन)
उपकुलसचिव (विद्या)

PHARMACEUTICS (MPH)

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES

(MPH 101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instrument dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know,

- Chemical and Excipients
- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

Theory **60 Hrs**

1. a. **UV-Visible spectroscopy:** Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, choice of solvents and solvent effect and Applications of UV-Visible spectroscopy. 11 Hrs

   b. **IR spectroscopy :** Theory, Modes of Molecular vibrations, sample handling, Instrumentation of Dispersive and Fourier-Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy.

   c. **Spectroflourimetry :** Theory of Fluorescence, Factors affecting fluorescence, Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   d. **Flame emission spectroscopy and Atomic Absorption Spectroscopy:** Principle, Instrumentation, Interferences and Applications.

2. **NMR spectroscopy :** Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, factors influencing chemical shift, Spin-Spin coupling, coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy. 11 Hrs

3. **Mass spectroscopy :** Principle, Theory, Instrumentation of Mass spectroscopy, Different types of ionization like electron impact, chemical field, FAB and MALDI, APCI, ESI, APPI Analysers of Quadrapole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy. 11 Hrs

BOS chairman

4. **Chromatography :** Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, and applications of the following: 11 Hrs

a) Paper Chromatography
b) Thin Layer chromatography
c) Ion exchange chromatography
d) Column chromatography
e) Gas chromatography
f) High Performance Liquid chromatography
g) Affinity chromatography

5. **a. Electrophoresis:** Principle, instrumentation, working condition, factors affecting separation and applications of the following: 11 Hrs

a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing

b. X ray Crystallography: Production of X rays, Different X ray diffraction methods, Bragg's law, Rotating crystal technique, X ray powder techniques, Types of crystals and applications of X-ray diffraction.

6. **Immunological assays:** RIA (Radio immuno assay), ELISA, Bioluminescence assays. 5Hrs

References

1. Spectrometric Identification of organic compounds- Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers, New Delhi, 1997.
5. Organic Spectroscopy - William Kemp, 3rd edition, ELBS, 1991.
6. Quantitative Analysis of Drugs in Pharmaceutical formulation – P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis – Modern methods – Part B – J W Munson, Volume 11, Marcel Dekker Series

19/11/13

Common Syllabus for

1. **PHARMACEUTICAL CHEMISTRY (MPC)**
2. **PHARMACEUTICAL QUALITY ASSURANCE (MQA)**
3. **PHARMACOLOGY (MPL)**
4. **PHARMACOGNOSY (MPG)**

MODERN PHARMACEUTICAL ANALYTICAL TECHNIQUES
(MPC 101T/MQA101T/MPL101T/MPG101T)

Scope

This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instrument dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.

Objectives

After completion of course student is able to know about chemicals and excipients

- The analysis of various drugs in single and combination dosage forms
- Theoretical and practical skills of the instruments

Theory **60 Hrs**

1. a. **UV-Visible spectroscopy:** Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/Derivative spectroscopy. 10 Hrs

   b. **IR spectroscopy :** Theory, Modes of Molecular vibrations, sample handling, Instrumentation of Dispersive and Fourier-Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation.

   c. **Spectroflourimetry :** Theory of Fluorescence, Factors affecting fluorescence (Characteristics of drugs that can be analysed by flourimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer.

   d. **Flame emission spectroscopy and Atomic absorption spectroscopy:** Principle, Instrumentation, Interferences and Applications.

2. **NMR spectroscopy :** Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, factors influencing chemical shift, Spin-Spin coupling, coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy. 10 Hrs

18/11/19

3. **Mass spectroscopy :** Principle, Theory, Instrumentation of Mass spectroscopy, 10 Hrs

Different types of ionization like electron impact, chemical field, FAB and MALDI, APCI, ESI, APPI Analysers of Quadrapole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.

4. **Chromatography :** Principle, apparatus, instrumentation, 10 Hrs
chromatographic parameters, factors affecting resolution, isolation of

drug from excipients, data interpretation and applications of the following:

a) Thin Layer chromatography
b) High Performance Thin Layer Chromatography
c) Ion exchange chromatography
d) Column chromatography
e) Gas chromatography
f) High Performance Liquid chromatography
g) Ultra High Performance Liquid chromatography
h) Affinity chromatography
i) Gel Chromatography

5. **a. Electrophoresis:** Principle, instrumentation, working condition, 10 Hrs
factors affecting separation and applications of the following:

a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing

b. X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder techniques, Types of crystals and applications of X-ray diffraction.

6. **a. Potentiometry :** Principle, working, Ion selective Electrodes and 10 Hrs

Applications of potentiometry.

b. Thermal Techniques: Principle, thermal transitions and Instrumentations (Heat flux and power compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (Sample preparation, experimental condition, calibration heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications.

Differential Thermal Analysis (DTA): Principle, instrumentation and advantage and disadvantages, pharmaceutical applications.

Derivative differential thermal analysis (DDTA)

TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.

References

1. Spectrometric Identification of organic compounds- Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
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6. Quantitative Analysis of Drugs in Pharmaceutical formulation – P D Sethi, 3rd Edition, CBS Publishers, New Delhi, 1997.
7. Pharmaceutical Analysis – Modern methods – Part B – J W Munson, Volume 11, Marcel Dekker Series
8. Spectroscopy of organic compounds, 2nd edition, P S Kalsi, Wiley estern Ltd., Delhi.
9. Textbook of Pharmaceutical Analysis, KA. Connors, 3rd edition, John Wiley & Sons, 1982.