

Textbook of **Pharmacognosy and Phytochemistry II**

Theory and Practical Course Codes BP504T and BP508P
for **Fifth Semester Bachelor in Pharmacy**

is aimed to serve as a complete textbook for the fifth semester students of Bachelor in Pharmacy covering both theoretical and practical parts as per the latest syllabus prescribed by the Pharmacy Council of India (Course Codes BP504T and BP508P).

The main objective of this book is to provide students with the knowledge of how secondary metabolites are generated in crude drugs, and how they are isolated and identified, and produced industrially. Also, the subject includes the study of chemistry and chemical classes, biosources, therapeutic uses, and commercial applications of drugs containing secondary metabolites. Upon completion of the study of this book, students will be able to use modern extraction techniques, characterization and identification, isolation, and identification of phytoconstituents of herbal medicines and phytoconstituents.

This book gives a comprehensive treatment of various metabolic pathways, modern extraction methods, separation methods, and spectroscopy techniques. It strikes a balance between essential and advanced areas of knowledge, apart from general topics. The subject matter is comprehensive and written in an easy to follow language, is suitably illustrated with well-labelled diagrams and contains tables in both the theoretical and practical parts.

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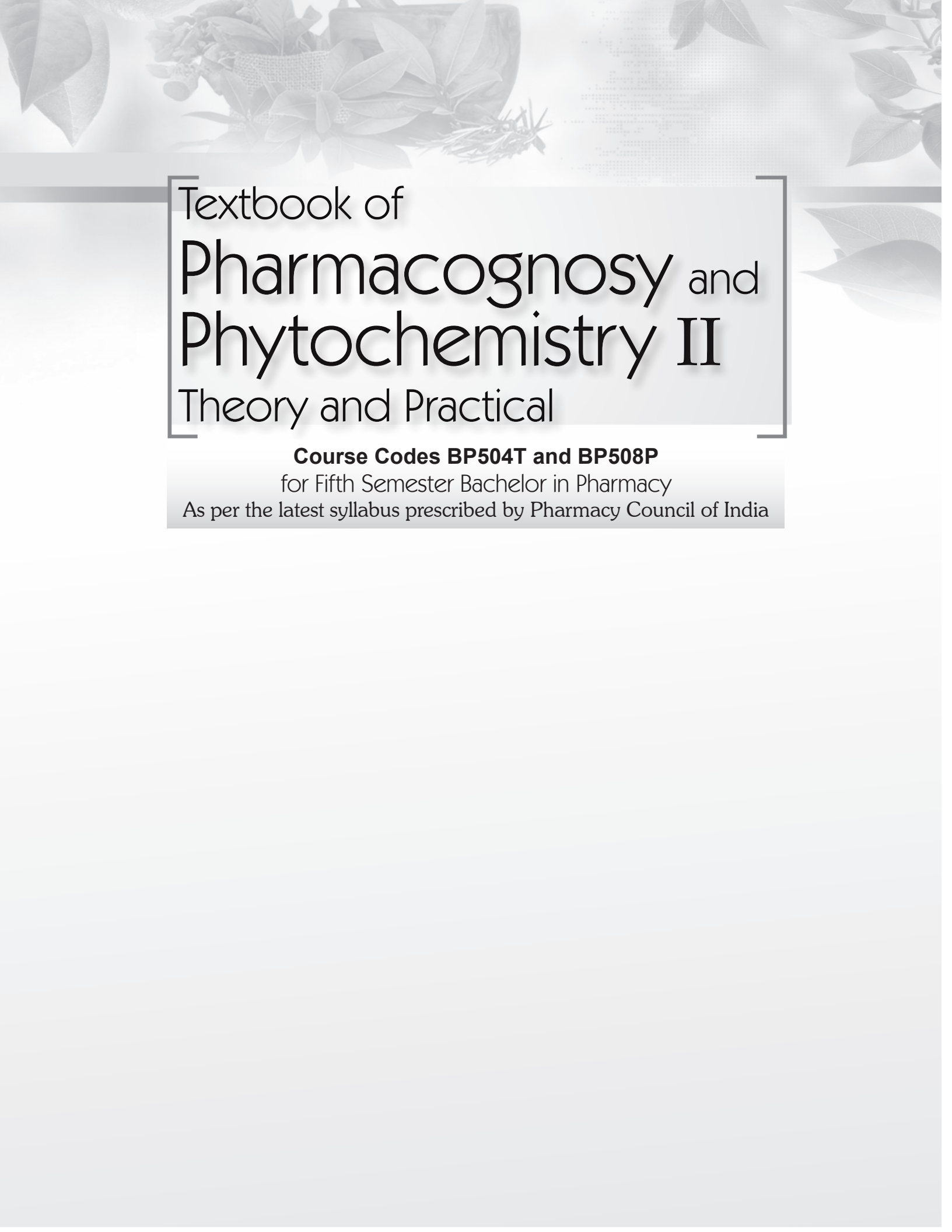
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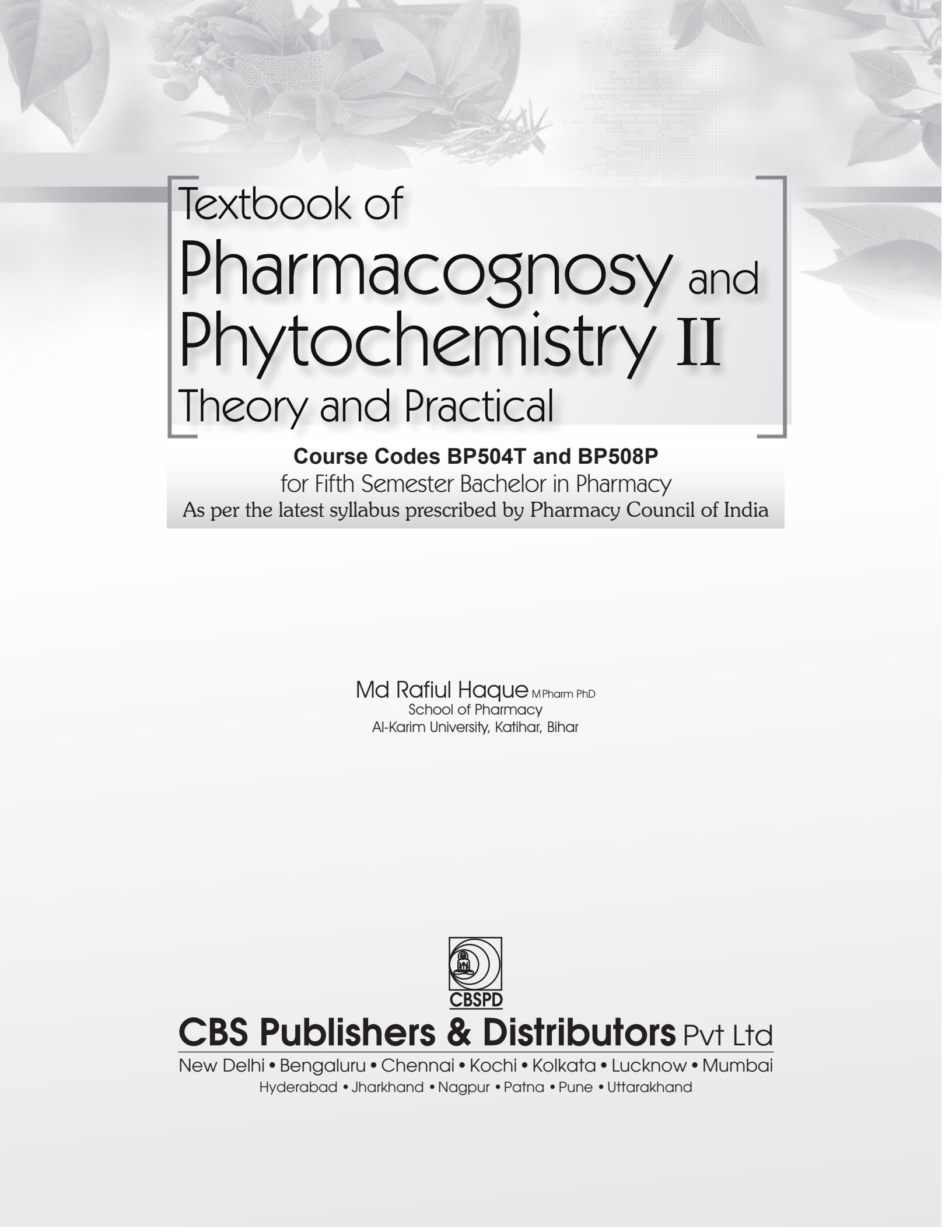


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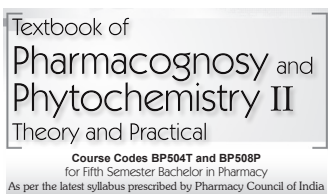


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Preface

It is a pleasure for the students of the fifth semester (3rd year) of BPharm to get acquainted with the first edition of *Textbook of Pharmacognosy and Phytochemistry II* as per the new PCI regulation. This book has both theoretical and practical parts for the convenience of students and teachers.

The theoretical part of this book is designed to provide basic knowledge on metabolic pathways and the formation of various secondary metabolites via the shikimic acid pathway, acetate pathway, and amino acid pathway and their determination through the use of radioactive isotopes in biogenetic studies.

This book will help in understanding the basic concepts of extraction of plant material, separation or isolation of active chemical constituents, and characterization or structure interpretation through spectroscopy techniques. In the theoretical part of this book, the chemistry and chemical classes, biosources, therapeutic uses, and commercial applications of drugs containing secondary metabolites such as alkaloids, glycosides, flavonoids, resins, volatiles, steroids and iridoids are discussed. The isolation, industrial production, identification, and uses of some important plant components are also discussed in this book.

The experimental part of this book is designed to provide basic practical knowledge on morphology, histology, and powder characteristics and the detection of cinchona, cinnamon, senna, clove, ephedra, and fennel, coriander, etc. Using this book will also help in understanding basic practical knowledge on extraction and isolation of some important active phytoconstituents and analysis of some unconsolidated crude oils (asafoetida, benzoin, colophony, aloe, myrrh) with the help of chemical tests.

The subject matter is illustrated with well-designed diagrams and tables. This book will be beneficial for the students as well as the professors.

Suggestions and criticisms are welcome.

Md Rafiul Haque

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Syllabus

PHARMACOGNOSY AND PHYTOCHEMISTRY II

THEORY

Course Code BP504T

45 Hours

Scope: The main purpose of subject is to impart the students the knowledge of how the secondary metabolites are produced in the crude drugs, how to isolate and identify and produce them industrially. Also this subject involves the study of producing the plants and phytochemicals through plant tissue culture, drug interactions and basic principles of traditional system of medicine

Objectives: Upon completion of the course, the student shall be able

1. to know the modern extraction techniques, characterization and identification of the herbal drugs and phytoconstituents
2. to understand the preparation and development of herbal formulation.
3. to understand the herbal drug interactions
4. to carryout isolation and identification of phytoconstituents

Course Content

UNIT I

7 Hours

- ✦ **Metabolic pathways in higher plants and their determination**
 - a. Brief study of basic metabolic pathways and formation of different secondary metabolites through these pathways—shikimic acid pathway, acetate pathways and amino acid pathway.
 - b. Study of utilization of radioactive isotopes in the investigation of biogenetic studies.

UNIT II

14 Hours

General introduction, composition, chemistry and chemical classes, biosources, therapeutic uses and commercial applications of following secondary metabolites:

- ✦ **Alkaloids:** Vinca, rauwolfia, belladonna, opium,
- ✦ **Phenylpropanoids and flavonoids:** Lignans, Tea, Ruta
- ✦ **Steroids, cardiac glycosides and triterpenoids:** Liquorice, dioscorea, digitalis
- ✦ **Volatile oils:** Mentha, clove, cinnamon, fennel, coriander,
- ✦ **Tannins:** Catechu, pterocarpus
- ✦ **Resins:** Benzoin, guggul, ginger, asafoetida, myrrh, colophony

- ✱ **Glycosides:** Senna, aloes, bitter almond
- ✱ **Iridoids, other terpenoids and naphthaquinones:** Gentian, artemisia, taxus, carotenoids

UNIT III**06 Hours**

Isolation, identification and analysis of phytoconstituents

- a. **Terpenoids:** Menthol, citral, artemisin
- b. **Glycosides:** Glycyrrhetic acid and rutin
- c. **Alkaloids:** Atropine, quinine, reserpine, caffeine
- d. **Resins:** Podophyllotoxin, curcumin

UNIT IV**10 Hours**

Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, sennoside, artemisinin, diosgenin, digoxin, atropine, podophyllotoxin, caffeine, taxol, vincristine and vinblastine

UNIT V**8 Hours**

Basics of Phytochemistry: Modern methods of extraction, application of latest techniques like spectroscopy, chromatography and electrophoresis in the isolation, purification and identification of crude drugs.

PRACTICAL**Course Code BP508P****4 Hours/Week**

1. Morphology, histology and powder characteristics and extraction and detection of: Cinchona, cinnamon, senna, clove, ephedra, fennel and coriander
2. Exercise involving isolation and detection of active principles
 - ✱ Caffeine from tea dust.
 - ✱ Diosgenin from dioscorea
 - ✱ Atropine from belladonna
 - ✱ Sennosides from senna
3. Separation of sugars by paper chromatography
4. TLC of herbal extract
5. Distillation of volatile oils and detection of phytoconstituents by TLC
6. Analysis of crude drugs by chemical tests: (i) Asafoetida; (ii) benzoin; (iii) colophony; (iv) aloes; (v) myrrh