INSTITUTE	**FACULTY OF PHARMACY**
PROGRAM	**BACHELOR OF PHARMACY**
SEMESTER	**5**
COURSE TITLE	**PHARMACOGNOSY AND PHYTOCHEMISTRY-II**
COURSE CODE	**13PH0503**
COURSE CREDITS	**6**

Objective:

1 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.

Course Outcomes: After completion of this course, student will be able to:

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 phyto-constituents

Pre-requisite of course: 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.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	1	4	75	15	10	35	15

Contents : Unit	Topics	Contact Hours
1	**Unit-1: Metabolic pathways in higher plants and their determination** 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.	7

DR. RAMESH BHANAJIBHAI PARMAR
Digitally signed by (Name of HOD)

DR. LALJI HAKUBHAI BALDANIYA
Digitally signed by (Name of Dean/ Principal)

Contents : Unit	Topics	Contact Hours
2	**Unit-2: Secondary metabolites** General introduction, composition, chemistry & 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 & 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 & Naphthaquinones: Gentian, Artemisia, taxus, carotenoids.	14
3	**Unit-3:Isolation, Identification and Analysis of Phytoconstituents** Isolation, Identification and Analysis of Phytoconstituents: a) Terpenoids: Menthol, Citral, Artemisin, b) Glycosides: Glycyrhetinic acid & Rutin, c) Alkaloids: Atropine, Quinine, Reserpine, Caffeine, d) Resins: Podophyllotoxin, Curcumin.	6
4	**Unit-4:Phytoconstituents** Industrial production, estimation and utilization of the following phytoconstituents: Forskolin, Sennoside, Artemisinin, Diosgenin, Digoxin, Atropine, Podophyllotoxin, Caffeine, Taxol, Vincristine and Vinblastine.	10
5	**Unit-5:Basics of Phytochemistry** 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.	8
Total Hours		**45**

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	**Tutorial** Workshop 1, Workshop 2, Workshop 3, Workshop 4, Workshop 5, Workshop 6, Workshop 7, Workshop 8, Workshop 9, Workshop 10, Workshop 11, Workshop 12, Workshop 13, Workshop 14, Workshop 15	15
2	**Practical** Experiment No.1, Experiment No.2, Experiment No.3, Experiment No.4, Experiment No.5, Experiment No.6, Experiment No.7, Experiment No.8, Experiment No.9, Experiment No.10, Experiment No.11, Experiment No.12, Experiment No.13, Experiment No.14, Experiment No.15	24
Total Hours		**39**

DR. RAMESH BHANAJIBHAI PARMAR
Digitally signed by (Name of HOD)

DR. LALJI HAKUBHAI BALDANIYA
Digitally signed by (Name of Dean/ Principal)

Textbook :

1 Trease and Evans Pharmacognosy,, Pharmacognosy W.C.Evans, W.B. Sounders & Co., 2009

References:

1 Pharmacognosy And Phytochemistry Volume 1 , Pharmacognosy And Phytochemistry Volume 1 , Mohammad Ali, CBS Publishers & Distribution, 2020

2 Pharmacognosy, Pharmacognosy, C.K. Kokate, Purohit, Gokhlae, Nirali Prakashan, 2007

3 The Herbal drug industry , The Herbal drug industry , R.D. Choudhary, Eastern Publisher, 1996

4 Essentials of Pharmacognosy,, Essentials of Pharmacognosy,, Dr.SH.Ansari, Birla publications, 2007

5 Herbal Cosmetics Handbook Paperback, Herbal Cosmetics Handbook Paperback, H.Pande, , Asia Pacific Business press, Inc,, 2015

6 The Textbook of Industrial Pharmacognosy,, The Textbook of Industrial Pharmacognosy,, A.N. Kalia, , CBS Publishers, , 2005

7 Plant cell Biotechnology,, Plant cell Biotechnology,, R Endress, , Springer-Verlag, 1994

8 Pharmacognosy and Pharmacobiotechnology Hardcover, Pharmacognosy and Pharmacobiotechnology Hardcover, James Bobbers, Marilyn KS, VE Tylor., Lippincott Williams and Wilkins, 1996

9 The Formulation and Preparation of Cosmetics, Fragrances and Flavors, The Formulation and Preparation of Cosmetics, Fragrances and Flavors, Louis Appell, Micelle Press, 1994

10 Pharmaceutical sciences., Pharmaceutical sciences., Remington's , John Wiley & Sons, 1990

11 Pharmaceutical Biotechnology, Pharmaceutical Biotechnology, Vyas and Dixit., CBS PUBLISHERS AND DISTRIBUTORS , 2007

12 Text Book of Biotechnology , Text Book of Biotechnology , R.C. Dubey., S Chand, 2007

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery					
Remember / Knowledge	**Understand**	**Apply**	**Analyze**	**Evaluate**	**Higher order Thinking / Creative**
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

1 The course delivery method will depend upon the requirement of content and the need of students. The teacher in addition to the conventional teaching method by the blackboard may also use any tools such as demonstration, role play, quiz, brainstorming, MOOCs etc.

2 The internal evaluation will be done based on continuous evaluation of students in the laboratory and classroom.

DR. RAMESH BHANAJIBHAI PARMAR
Digitally signed by (Name of HOD)

DR. LALJI HAKUBHAI BALDANIYA
Digitally signed by (Name of Dean/ Principal)

Instructional Method:

3 Students will use supplementary resources such as online videos, NPTEL videos, MOOCs/ e-courses, virtual laboratories.