

INSTITUTE	FACULTY OF PHARMACY
PROGRAM	BACHELOR OF PHARMACY
SEMESTER	6
COURSE TITLE	HERBAL DRUG TECHNOLOGY
COURSE CODE	13PH0603
COURSE CREDITS	6

Objective:

- 1 This subject gives the student the knowledge of basic understanding of the herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical, etc. The subject also emphasizes Good Manufacturing Practices (GMP), patenting, and regulatory issues of herbal drugs.

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

- 1 Understand raw material as a source of herbal drugs from cultivation to herbal drug product
- 2 Know the WHO and ICH guidelines for the evaluation of herbal drugs.
- 3 Know the herbal cosmetics, natural sweeteners, nutraceuticals.
- 4 Appreciate patenting of herbal drugs, GMP.

Pre-requisite of course: Scope: This subject gives the student the knowledge of basic understanding of the herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical, etc. The subject also emphasizes Good Manufacturing Practices (GMP), patenting, and regulatory issues of herbal drugs. Objective: Upon completion of this course the student should be able to: 1. Understand raw material as a source of herbal drugs from cultivation to herbal drug product 2. Know the WHO and ICH guidelines for the evaluation of herbal drugs. 3. Know the herbal cosmetics, natural sweeteners, nutraceuticals. 4. Appreciate patenting of herbal drugs, GMP.

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	<p>Unit-1: Herbs as raw materials: Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation Source of Herbs Selection, identification and authentication of herbal materials Processing of herbal raw material Biodynamic Agriculture Good agricultural practices in the cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides. Indian Systems of Medicine a) Basic principles involved in Ayurveda, Siddha, Unani, and Homeopathy Preparation and standardization of Ayurvedic formulations viz Aristas and Asavas, Ghutika, Churna, Lehya, and Bhasma.</p>	
2	<p>Unit-2: Nutraceuticals General aspects, Market, growth, scope, and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome, and various gastrointestinal diseases. Study of following herbs as a health food: Alfalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina Herbal-Drug, and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypericum, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.</p>	
3	<p>Unit-3: Herbal Cosmetics Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skincare, hair care, and oral hygiene products. Herbal excipients: Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes. Herbal formulations: Conventional herbal formulations like syrups, mixtures, and tablets and Novel dosage forms like phytosomes.</p>	
4	<p>Unit-4: Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs. Patenting and Regulatory requirements of natural products: Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting, and Biopiracy, Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem. Regulatory Issues: Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs</p>	

Contents : Unit	Topics	Contact Hours
5	Unit-5: General Introduction to Herbal Industry Herbal drugs industry: Present scope and prospects. A brief account of plant-based industries and institutions involved in work on medicinal and aromatic plants in India. Schedule-T Good Manufacturing Practice of Indian systems of medicine: Components of GMP (Schedule-T) and its objectives Infrastructural requirements, working space, storage area, machinery and equipment, standard operating procedures, health and hygiene, documentation, and records.	
Total Hours		

Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
1	Tutorials Workshop no.1, Workshop no.2, Workshop no.3, Workshop no.4, Workshop no.5, Workshop no.6, Workshop no.7, Workshop no.8, Workshop no.9, Workshop no.10, Workshop no.11, Workshop no.12, Workshop no.13, Workshop no.14, Workshop no.15	
2	Practicals 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	
Total Hours		

Textbook :

- 1 Textbook of Pharmacognosy, by, Trease & Evans., 1978

References:

- 1 Textbook of Pharmacognosy by Tyler, Brady & Robber.
- 2 Pharmacognosy by Kokate, Purohit, and Gokhale.
- 3 Essential of Pharmacognosy by Dr. S. H. Ansari.
- 4 Pharmacognosy & Phytochemistry by V. D. Rangari.
- 5 Pharmacopoeial standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
- 6 Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

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
20.00	35.00	20.00	15.00	10.00	0.00

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