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DEPARTMENT OF PHARMACY

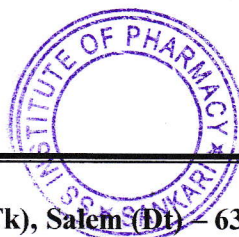
OUTCOME BASED TEACHING AND LEARNING (OBTL)

VISION:

To be a leading center of excellence in pharmaceutical sciences, recognized for its innovative research, cutting-edge education, and significant contributions to the development and delivery of safe and effective medicines

MISSION:

- To advance the science and technology of drug formulation and delivery through research and innovation.
- To educate and train future pharmaceutical scientists and professionals who are knowledgeable, skilled, and committed to improving human health.
- To collaborate with industry and other stakeholders to translate research findings into practical solutions for the development and delivery of safe and effective medicines.



[Signature]
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SALEM - 637301

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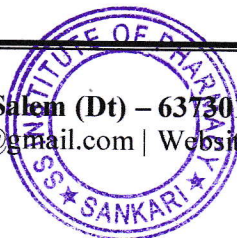
and The Directorate of Medical Education, Chennai.

1. COURSE DETAILS:

COURSE WITH CODE	BP603 HERBAL DRUG TECHNOLOGY–THEORY
PROGRAMME	B.PHARMACY
COURSE CREDIT	4
COURSE COORDINATOR	Mr.A.Alageshwaran (Associate Professor)
COURSE FACILITATOR	Mr.T.Sampathkumar (Associate Professor)
COURSE PREREQUISITES	Basic Knowledge on Herbal Drug Industry, understanding of Raw materials ,GMP, Herbal drugs and herbal cosmetics
COURSE TYPE	Core course
COURSE DESCRIPTION	This subject gives the student the knowledge of basic understanding of herbal drug industry, the quality of raw material, guidelines for quality of herbal drugs, herbal cosmetics, natural sweeteners, nutraceutical etc. The subject also emphasizes on Good Manufacturing Practices (GMP), patenting and regulatory issues of herbal drugs
COURSE OBJECTIVES	Upon completion of this course the student should be able to: 1. understand raw material as source of herbal drugs from cultivation to herbal drug product 2. know the WHO and ICH guidelines for evaluation of herbal drugs 3. know the herbal cosmetics, natural sweeteners, nutraceuticals 4. appreciate patenting of herbal drugs, GMP .
CAREER OPPORTUNITIES	The graduates will find the opportunities to see their carrier development in Drug design and discovery and research and development.
TEACHING AND LEARNING METHODOLOGY	Class room lecture, PPTs, Videos, MCQs, Crossword Puzzles, Flash Cards

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2. OUTCOMES AND MAPPING

PROGRAM EDUCATIONAL OBJECTIVES

PEO-1: Pharmacy Graduates will be competent professional pharmacist who will utilize and practice professional principles of pharmacy in self-practice, hospitals, government and non-government organizations, academics, research institutions and co-operate sector.

PEO-2: Graduates will integrate knowledge of basic sciences and pharmaceuticals in order to modify treatment approaches that reflect the breadth and scope of pharmacy practice and demonstrate clinical competency in evaluation, treatment planning and implementation.

PEO-3: Graduates will have leadership skills with high level of integrity for team building and also have ability to function professionally with ethical responsibility as an individual as well as in multidisciplinary team with positive attitude.

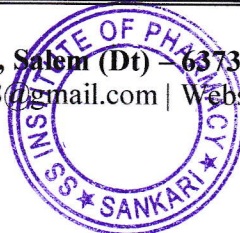
PEO-4: CU Pharmacy Graduates will sustain continual professional development through lifelong learning activities and work for development of field that includes creation, absorption and adoption of new knowledge and tools.

PEO-5: CU Pharmacy Graduates will have knowledge to support the pharmaceutical industries, in their economic development, legal and regulatory prospective of drug approvals at national international level and will be able to address social and economic challenges of the nation.

PO'S FOR B.PHARMACY PROGRAM

PO 01	Pharmacy Knowledge: Possess knowledge and comprehension of the core and basic knowledge associated with the profession of pharmacy, including biomedical sciences; pharmaceutical sciences; behavioural, social, and
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	administrative pharmacy sciences; and manufacturing practices.
PO 02	Planning Abilities: Demonstrate effective planning abilities including time management, resource management, delegation skills and organizational skills. Develop and implement plans and organize work to meet deadlines.
PO 03	Problem analysis: Utilize the principles of scientific enquiry, thinking analytically, clearly and critically, while solving problems and making decisions during daily practice. Find, analyse, evaluate and apply information systematically and shall make defensible decisions.
PO 04	Modern tool usage: Learn, select, and apply appropriate methods and procedures, resources, and modern pharmacy-related computing tools with an understanding of the limitations.
PO 05	Leadership skills: Understand and consider the human reaction to change, motivation issues, leadership and team-building when planning changes required for fulfilment of practice, professional and societal responsibilities. Assume participatory roles as responsible citizens or leadership roles when appropriate to facilitate improvement in health and well-being.
PO 06	Professional Identity: Understand, analyse and communicate the value of their Professional roles in society (e.g. health care professionals, promoters of health, educators, managers, employers, employees).
PO 07	Pharmaceutical Ethics: Honour personal values and apply ethical principles in Professional and social contexts. Demonstrate behaviour that recognizes cultural and personal variability in values, communication and lifestyles. Use ethical frameworks; apply ethical principles while making decisions and take

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	responsibility for the outcomes associated with the decisions.
PO 08	Communication: Communicate effectively with the pharmacy community and with society at large, such as, being able to comprehend and write effective reports, make effective presentations and documentation, and give and receive clear instructions.
PO 09	The Pharmacist and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety and legal issues and the consequent responsibilities relevant to the professional pharmacy practice.
PO 10	Environment and sustainability: Understand the impact of the professional Pharmacy solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 11	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change. Self-assess and use feedback effectively from others to identify learning needs and to satisfy these needs on an ongoing basis.

PROGRAM SPECIFIC OUTCOMES (PSO'S)

PSO-1: CU Pharmacy Graduates will have fundamental knowledge in preparing conventional as well as novel pharmaceutical dosage forms, their methods of dispensing and recent advancements made in the field of Pharmaceutical Product Development.

PSO-2: The Graduates will develop an ability to design, conduct, and interpret various analytical studies/reports being used by pharmaceutical industries during drug design, formulation design, and

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production etc.

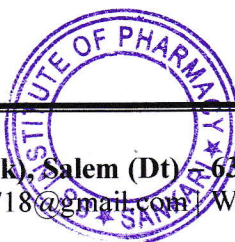
PSO-3: CU Pharmacy Graduates will have an understanding about different laws that govern different aspects of pharmacy that builds up their fundamental knowledge about the ethics associated with the profession of pharmacy.

PSO-4: CU Pharmacy Graduates will have an understanding about different laws that govern different aspects of pharmacy that builds up their fundamental knowledge about the ethics associated with the profession of pharmacy.

PO, PSO AND CO MAPPING

C 328 - Herbal Drug Technology–Theory											
Course Outcomes	PO 01	PO 02	PO 03	PO 04	PO 05	PO 06	PO 07	PO 08	PO 09	PO 10	PO 11
C 328.1	2	1	1	-	-	1	-	-	1	1	2
C 328.2	3	3	3	1	-	-	1	-	1	2	3
C 328.3	3	3	2	2	1	-	-	1	1	2	3
C 328.4	2	2	2	-	1	2	3	2	2	2	3
C 328.5	2	3	3	2	2	2	3	2	2	2	3

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3. BOOKS AND REFERENCES:

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

Web Resources

https://drive.google.com/folderview?id=1fy5ZfnyG-j_a6kExDsC8E8F7XGfE1QGZ	All pharmacy books
https://www.ahrq.gov/health-literacy/improve/pharmacy/index.html	All Units

MAGAZINES AND JOURNALS FOR REFERENCE

NAME OF JOURNALS	NAME OF MAGAZINES
Indian Journal of Pharmaceutical Sciences	Pharmacy Times
The Indian Journal of Pharmacy	Pharmacist's Letter
Current trend in pharmacy	The Pharmaceutical Journal
Journal of Pharmaceutical and biological Sciences	World Pharmaceutics
Drug Development and Industrial Pharmacy	Journal of Pharmacy Practice

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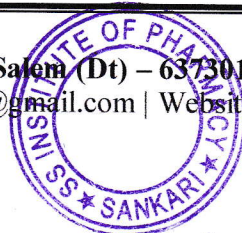
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4. BLOOMS TAXONOMY (BT) AND LESSON PLAN

Learning /Course outcome	Learning outcome	Topic	No of hours	Reference
UNIT -I				
LO1/CO1	To Understand the knowledge about Herbs as raw materials	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	4	T1
LO2/CO1	To Understand the concept of Biodynamic Agriculture	Biodynamic Agriculture Good agricultural practices in cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.	3	T1
LO3/CO1	To Understand the Indian Systems of Medicine And its preparation	Indian Systems of Medicine a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika, Churna, Lehya and Bhasma.	4	T1
UNIT II				
LO4/CO2	To Understand the detail of Nutraceuticals	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 Gastro intestinal	4	T2,R2

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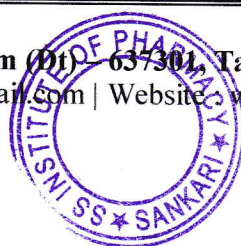
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		diseases. Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina		
LO5/CO2	To Understand the Herbal- Drug and Herb-Food Interactions	Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.	3	T2,R2
UNIT III				
LO8/CO3	To Understand in detail about Herbal Cosmetics	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 skin care, hair care and oral hygiene products.	4	T1,R1
LO9/CO3	To Understand in detail about Herbal excipients	Herbal excipients: Herbal Excipients – Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.	3	T1,R1
LO10/CO3	To Understand in detail about Herbal formulations	Herbal formulations : Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes	3	T1,R1
UNIT IV				
LO11/CO4	To Understand the Evaluation of Drugs and	Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.	3	T1,R3

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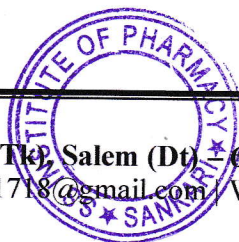
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	guidelines			
LO12/CO4	To Understand the Patenting and Regulatory requirements of natural products	Patenting and Regulatory requirements of natural products: a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracyb) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.	4	T1,R3
LO13/CO4	To Understand the Regulatory Issues	Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.	3	T1,R1
UNIT V				
LO14/CO5	To Understand the General Introduction to Herbal Industry	General Introduction to Herbal Industry Herbal drugs industry: Present scope and future prospects. A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India.	3	T1,R1
LO15/CO5	To know the Schedule T – Good Manufacturing Practice of Indian systems of medicine and GMP	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 equipments, standard operating procedures, health and hygiene, documentation and records.	4	T1,R1

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ASSESSMENT METHODOLOGIES

Internal Assessment: Continuous Mode

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme given below.

Table-XI: Scheme for awarding internal assessment: Continuous mode

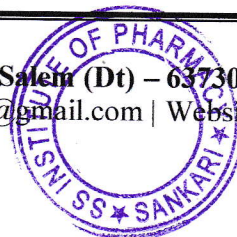
Criteria	Maximum Marks (Theory)	Maximum Marks (Practical)
Attendance (Refer Table – XII)	4	2
Academic activities (Average of any 3 activities e.g. quiz, assignment, open book test, field work, group discussion and seminar)	3	1.5
Student – Teacher interaction	3	1.5
Total	10	5

Practical

Criteria	Maximum Marks
Attendance (Refer Table – XII)	2
Based on Practical Records, Regular viva voce, etc.	3
Total	5

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Table-XII: Guidelines for the allotment of marks for attendance

Percentage of Attendance	Theory	Practical
95 – 100	4	2
90 – 94	3	1.5
85 – 89	2	1
80 – 84	1	0.5
Less than 80	0	0

Question paper pattern for theory Sessional examinations

For subjects having University examination

I. Multiple Choice Questions (MCQs) = 10 x 1 = 10

OR

OR

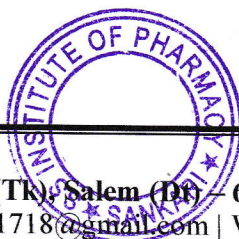
Objective Type Questions (5 x 2) = 05 x 2 = 10


(Answer all the questions)

I. Long Answers (Answer 1 out of 2) = 1 x 10 = 10

II. Short Answers (Answer 2 out of 3) = 2 x 5 = 10

Total = 30 marks




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For subjects having Non University Examination

- I. Long Answers (Answer 1 out of 2) = 1 x 10 = 10
II. Short Answers (Answer 4 out of 6) = 4 x 5 = 20

Total = 30 marks

Question paper pattern for practical sessional examinations

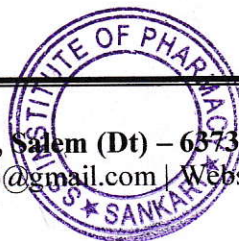
- I. Synopsis = 10
II. Experiments = 25
III. Viva voce = 05

Total = 40 marks

Prepared by (Course facilitator)	Verified by	Approved by
Mr.T.Sampathkumar (Associate Professor)	Mr.A.Alageshwaran (Associate Professor)	Dr.C.Jothimanivannan Professor & Principal

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B.PHARMACY PROGRAM

Name of the Teacher/Designation: Mr.T.SAMPATHKUMAR/ASSISTANT PROFESSOR

Course Code/Title: - 562063/HERBAL DRUG TECHNOLOGY - (THEORY)

BATCH: 2023-2027

Course Component:Core

Course Outcomes	CO1	CO2	CO3	CO4	CO5
CO-Direct Assessment- Internal (80%)	75.6363636	74.182	33.455	46.545	69.818
CO-Indirect Assessment- Internal(20%)	20.00	20.00	20.00	20.00	20.00
CO-Internal Assessment (60%)	57.3818182	56.509	32.073	39.927	53.891
CO-External Assessment(40%)	35.64	35.64	35.64	35.64	35.64
Total- Internal(60%) +External (40%)	77.38	92.15	67.71	75.57	89.53
Attainment Level	2	3	1	2	3

Attainment Level	Target Achieved
3	80
2	70
1	60
Others	0

CO-PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C328.1	3	1	1	1	1	1	1	2	3	2	3
C328.2	3	2	3	2	1	1	1	2	2	2	3
C328.3	3	3	3	2	1	1	2	2	3	2	3
C328.4	3	1	2	3	2	1	1	2	3	2	3
C328.5	3	3	3	3	1	2	1	1	3	1	3

CO-PO Attainment

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
C328.1	2.00	0.67	0.67	0.67	0.67	0.67	0.67	1.33	2.00	1.33	2.00
C328.2	3.00	2.00	3.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00	3.00
C328.3	1.00	1.00	1.00	0.67	0.33	0.33	0.67	0.67	1.00	0.67	1.00
C328.4	2.00	0.67	1.33	2.00	1.33	0.67	0.67	1.33	2.00	1.33	2.00
C328.5	3.00	3.00	3.00	3.00	1.00	2.00	1.00	1.00	3.00	1.00	3.00
C328	2.20	1.47	1.80	1.67	0.87	0.93	0.80	1.27	2.00	1.27	2.20