

Competency-Based Dynamic Curriculum for MD/ MS SIDDHA

(PRESCRIBED BY NCISM)

தொட்டனைத் தூறும் மணற்கேணி மாந்தர்க்குக் கற்றனைத் தூறும் அறிவு

Semester II
Applied Basics of Gunapadam Marunthiyal
(Materia Medica, Pharmacology and Pharmacognosy)
(SUBJECT CODE : SIDPG-AB-GM)

(Applicable from 2025-26 batch, from the academic year 2025-26 onwards until further notification by NCISM)



॥ आयुषे सर्वलोकानाम् ॥



BOARD OF UNANI, SIDDHA AND SOWA-RIGPA
NATIONAL COMMISSION FOR INDIAN SYSTEM OF MEDICINE
NEW DELHI-110026

PREFACE

Gunapadam Marunthiyal, a branch of Siddha Pharmacology, focuses on medicinal herbs, metals, minerals, salts, gems, and animal products. This field underpins drug development in Siddha medicine, addressing classifications based on taste, potency, and therapeutic uses. It aims to create an updated knowledge base for Siddha practitioners to treat ailments effectively and promote overall health. A key aspect is maintaining balance in the body's humors to achieve optimal health.

Pharmacognosy, the study of medicinal drugs from plants and natural resources, plays an important role in Marunthiyal. Medicinal plants are classified based on therapeutic actions, geological distribution, seasonal patterns, and disease associations, facilitating their use in formulations. It includes the identification, authentication, and preliminary phytochemistry of plants, which is essential for advancing plant-based studies. This knowledge helps postgraduate students address challenges in modern drug discovery, particularly with plant, mineral, and animal-derived products.

Purification of drugs has always been emphasized in Siddha medicine for better therapeutic outcomes, with indigenous methods developed for preparing medicines. Advancements in science have improved the quality of treatments, ensuring the broader benefits of Siddha medicine.

The Fauna in Gunapadam Marunthiyal offers insights into the properties and therapeutic uses of animals and animal products. Modern chemistry is integrated with ancient Siddha knowledge to uncover the chemical reactions involved in purification, calcination, oxidation, and alchemy. Siddhars were pioneers in the field of Alchemy which involves various minerals, metals, and herbs to create medicinal preparations considered elixirs that prolongs life. Recent advances in metallo-therapeutics and nanotechnology provide a deeper understanding of the chemical and instrumental analysis of metal-based drugs.

Marunthiyal equips students with essential pharmacological skills, exploring both theoretical and practical aspects. Students gain a comprehensive understanding of pharmacology, learning to design and conduct rigorous experimental studies to validate Siddha formulations. The guidelines of regulatory bodies namely GAP, GSP, GMP, GLP and GCP are adopted to maintain the quality standards of Siddha drugs. This interdisciplinary knowledge contributes to the scientific community through research and publications.

The field of Marunthiyal will create a base and provide specialized training for postgraduate students. It will also open new avenues for their careers and foster the development of drug standardization and novel drug research. This knowledge will enable students to explore other fields and further the benefits and applications of Siddha medicine. Ultimately, the goal is to create a scientifically validated Siddha system that will provide appropriate exposure and development for postgraduate students to become a responsible, academician, researcher, entrepreneur with practicing the skills.

INDEX

Summary & Credit Framework	4
Course Code and Name of Course	5
Table 1 : Course learning outcomes and mapped Program learning outcomes	5
Table 2 : Course contents (Modules- Credits and Notional Learning Hours)	6
Table 3 : Modules - Unit - Module Learning Objectives and Session Learning Objective- Notional Learning Hours- Domain-Level- TL Methods	23
Table 4 : Practical Training Activity	88
Table 5 : Experiential learning Activity	91
Table 6 : Assessment Summary: Assessment is subdivided in A to H points	94
6 A : Number of Papers and Marks Distribution	94
6 B : Scheme of Assessment (Formative and Summative Assessment)	94
6 C : Calculation Method for Modular Grade Points (MGP)	94
6 D : Semester Evaluation Methods for Semester Grade Point Average (SGPA)	96
6 E : Question Paper Pattern	96
6 F : Distribution for summative assessment (University examination)	98
6 G : Instruction for the paper setting & Blue Print for Summative assessment (University Examination)	100
6 H : Distribution of Practical Exam (University Examination)	101
Reference Books/ Resources	102
Abbreviations	105

We want that education by
which **character** is formed,
strength of mind is increased,
the **intellect** is expanded, and by
which one can **stand on one's**
own feet.

-Swami Vivekananda

NCISM

(NATIONAL COMMISSION FOR INDIAN SYSTEM OF MEDICINE)

Competency-Based Dynamic Curriculum MD/ MS SIDDHA

Applied Basics of Gunapadam Marunthiyal (SIDPG-AB-GM)

Summary & Credit Framework

Semester II

Module Number & Name	Credits	Notional Learning Hours	Maximum Marks of assessment of modules (Formative Assessment)
M1. Marunthugalin peyaridal matrum vagaippadu(Basics, Nomenclature, and classification of drugs)	2	60	50
M2. Marunthagaviyal (Pharmacopoeias)	2	60	50
M3. Mooligai vaguppu (Herbal drugs)	2	60	50
M4. Good Agriculture, Collection and Storage practices	2	60	50
M5. Cultivation methods	2	60	50
M6. Constrains in herbal drugs	1	30	25
M7. Thathu Vaguppu (Metals, Minerals and Salts)	2	60	50
M8. Jeeva Vaguppu (Zoological products)	2	60	50
M9. Kadal porutkal (Marine Products)	1	30	25
	16	480	400

Credit frame work

SIDPG-AB-GM consists of 9 modules totaling 16 credits, which correspond to 480 Notional Learning Hours. Each credit comprises 30 hours of learner engagement, distributed across teaching, practical, and experiential learning in the ratio of 1:2:3. Accordingly, one credit includes 5 hours of teaching, 10 hours of practical training, 13 hours of experiential learning, and 2 hours allocated for modular assessment, which carries 25 marks.

Important Note: The User Manual MD/MS Siddha is a valuable resource that provides comprehensive details about the curriculum file. It will help you understand and implement the curriculum. Please read the User Manual before reading this curriculum file. The curriculum file has been thoroughly reviewed and verified for accuracy. However, if you find any discrepancies, please note that the contents related to the MSE should be considered authentic. In case of difficulty and questions regarding the curriculum, write to syllabus24sid@ncismindia.org.

Course Code and Name of Course

Course code	Name of Course
SIDPG-AB-GM	Applied Basics of Gunapadam Marunthiyal (Materia Medica, Pharmacology and Pharmacognosy)

Table 1 : Course learning outcomes and mapped Program learning outcomes

CO No	A1 Course learning Outcomes (CO) SIDPG-AB-GM At the end of the course SIDPG-AB-GM, the students should be able to-	B1 Course learning Outcomes mapped with program learning outcomes.
CO1	Demonstrate and appreciate the authoritative understanding of Siddha fundamental principles like Suvai, Veerium and Pirivu in Siddha Marunthiyal.	PO1,PO2,PO3,PO6
CO2	Perform Authentication, Purification of Raw drugs of Herbal, Metal, Mineral and animal origin used in traditional medicines and develop skills in identifying the adulterants.	PO3,PO4,PO5
CO3	Assess and evaluate Quality standards of Siddha Raw drugs of herbal, metal, mineral and animal origin and describe key framework of regulatory bodies adopting GAP, GSP, GMP, GLP and GCP.	PO4,PO5
CO4	Integrate Principles of Chemistry, Pharmacology, Toxicology with Marunthiyal in New Drug Development and demonstrate proficiency in Fundamentals of Analytical Chemistry and Analytical Instrumentation and Interpret them in the characterization of raw drugs	PO4,PO5
CO5	Analyze and apply emerging fields of Pharmacology such as Pharmacogenomics and Nano pharmacology in Siddha system of Medicine in the understanding of Individual Variability, disease susceptibility and treatment responses to Siddha Formulations.	PO4,PO5
CO6	Demonstrate the socio-economic importance of Herbal, Metals, minerals, and animal drugs with special reference to trade, cosmetology, and nutraceuticals.	PO7
CO7	Design, develop and carry out high quality research in standardization and exploration of nanoscience in Siddha Marunthiyal	PO4
CO8	Acquire skills to become a socially responsible clinician, teacher, researcher, entrepreneur by practicing the skills learnt and ethical practices for selection of raw materials and their rationale use.	PO2,PO3,PO6

Table 2 : Course contents (Modules- Credits and Notional Learning Hours)

2A Module Number	2B Module & units	2C Number of Credits	Notional Learning Hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including Modular Assessment	2G Total
1	M-1 Marunthugalin peyaridal matrum vagaippadu(Basics, Nomenclature, and classification of drugs) The module describes the history of Gunapadam, nomenclature of drugs used by different Siddhars, their classifications and the types of Ulmarunthu and Puramarunthu and their shelf life. • M1U1 History of Gunapadam (Siddha Materia Medica) 1.1.1 Documentation of herbs by various Siddhars 1.1.2 Works of various Siddhars on Medicinal plants 1.1.3 Role of Sambasivam Pillai, Kannusamiyam in Siddha Materia Medica 1.1.4 Evolution of <i>Patharthagunasindamani</i> to Gunapadam 1.1.5 Gunapadam to Pharmacopoeias • M1U2 .Nomenclature 1.2.1. <i>Siddhar Therayar</i> theory 1.2.2. <i>Siddhar Agathiyar</i> theory 1.2.3. <i>Siddhar Bogar</i> theory 1.2.4. <i>Kannusamiyam</i> theory 1.2.5. <i>Siddhar Yuhimuni</i> theory	2	10	20	30	60

1.2.6. *Siddhar Thirumoolar* concepts

• **M1U3 Types of Internal and External medicines with their shelf life**

- 1.3.1. 32 Types of *ulmarunthugal* (Internal medicines)
- 1.3.2. 32 Types of *Puramarunthugal* (External medicines)
- 1.3.3. Processes involved in preparing Internal and External medicines
- 1.3.4. Shelf life of *Ulmarunthugal*- Gunapadam and AYUSH guidelines
- 1.3.5. Shelf life of *Puramarunthugal*- Gunapadam and AYUSH guidelines
- 1.3.6. *Karuvigal and Iyanthirangal*

• **M1U4 Classification of Drugs**

- 1.4.1. Classification as per traditional methods of Herbal Drugs.
 - 1.4.1.1. Plants classified based on Habitat
 - 1.4.1.2. Plants classified based on *Suvai, Thanmai and Pirivu*
 - 1.4.1.3. Plants classified based on parts used
 - 1.4.1.4. Plants classified based on actions
 - 1.4.1.5. Plants classified based on presence of metals like Iron, Copper, Lead.
 - 1.4.1.6. Basic classification of *Thathu porutkal with Panchabootha thathuvam*.
 - 1.4.1.7. Classification of *Jeeva porutkal* (Animal and its byproducts)
- 1.4.2. Classification based on *Natpu sarakku, Pagai sarakku*
 - 1.4.2.1. *Ayam* (Iron)
 - 1.4.2.2. *Karuvangam*(Lead)
 - 1.4.2.3. *Sembu* (Copper)
 - 1.4.2.4. *Naagam* (Zinc)
 - 1.4.2.5. *Thangam* (Gold)

	1.4.2.6. <i>Rasam</i> (Mercury) 1.4.2.7. <i>Ganthagam</i> (Sulphur) 1.4.2.8. <i>Pachai karpooram</i> (Borneo camphor) 1.4.2.9. <i>Thurusu</i> (Copper sulphate) 1.4.3. Modern classification (<i>Mooligai, Thathu and Jeevam</i>) 1.4.3.1. Binomial classification, Zoological classification. 1.4.3.2. Classification of medicinal plants from important families 1.4.3.3. Medicinally used greens 1.4.3.4. Pharmacopoeia classification 1.4.3.5. Regional classification 1.4.3.6. Disease wise classification					
2	M-2 Marunthagaviyal (Pharmacopoeias) The module describes the importance of pharmacopoeia for the identification of drugs and guidelines to be adopted for the quality control of drugs • M2U1 Indian Pharmacopoeias 2.1.1. Siddha Pharmacopoeia of India 2.1.2. Ayurveda Pharmacopoeia of India 2.1.3. Unani Pharmacopoeia of India 2.1.4. Homeopathy Pharmacopoeia of India 2.1.5. Indian Pharmacopoeia 2.1.6. Food Safety and Standard Authority of India • M2U2 International Pharmacopoeias 2.2.1. British Herbal Pharmacopoeia	2	10	20	30	60

	2.2.2. United states Pharmacopoeia 2.2.3. European Union Pharmacopoeia 2.2.4. Chinese pharmacopoeia 2.2.5. Japanese Herbal Pharmacopoeia • M2U3 Quality standards 2.3.1. Pharmacopoeia Commission for Indian Medicine (PCIM) 2.3.2. AYUSH Guidelines 2.3.3. Drug Controller General of India (DCGI) 2.3.4. Indian Council for Medical Research (ICMR) 2.3.5. National Medicinal Plant Board (NMPB) 2.3.6. Bureau of Indian Standards (BIS) 2.3.7. Drugs and Cosmetics act, 1940 2.3.8. Quality Council of India (QCI)					
3	M-3 Mooligai vaguppu (Herbal drugs) The module describes the distributions, authentication, adulteration, substitutes, collection, processing methods, purification, Schedule E1 and J, Magic remedies act and about commercially important medicinal plants. • M3U1 Distribution and availability 3.1.1. Distribution and availability of Herbal drugs- Indian scenario 3.1.2. Distribution and availability of Herbal drugs- International scenario	2	10	20	30	60

• **M3U2 Challenges and limitations**

- 3.2.1. Geographical variation
- 3.2.2. Collection of raw materials free of diseases
- 3.2.3. Variation in phytochemicals based on seasons and plant parts
- 3.2.4. Pesticide residues in Medicinal plants
- 3.2.5. Microbial contamination in medicinal plants
- 3.2.6. Heavy metal contamination

• **M3U3 Authentication, Substitutes, Alternatives**

- 3.3.1. Authentication by traditional methods
- 3.3.2. Authentication by pharmacopoeia standards
- 3.3.3. Drugs used as substitutes
- 3.3.4. Drugs used as alternatives

• **M3U4 Specific collection and processing methods**

- 3.4.1. *Seenthil (Tinospora cordifolia)*
- 3.4.2. *Erukku (Calotropis gigantea)*
- 3.4.3. *Vasambu (Acorus calamus)*
- 3.4.4. *Poondu (Allium sativum)*
- 3.4.5. *Chukku (Zingiber officinale)*
- 3.4.6. *Aamanakku ennai (Ricinus communis)*
- 3.4.7. *Pachai ennai – Ootrina ennai*
- 3.4.8. *Mooligai uppukkal (Herbal salts)*

• **M3U5 Purification and scientific rationale**

- 3.5.1. *Serankottai (Semecarpus anacardium)*
- 3.5.2. *Nervalam (Croton tiglium)*
- 3.5.3. *Kungiliyam (Shorea robusta)*
- 3.5.4. *Thetran (Strychnos potatorum)*
- 3.5.5. *Etti (Strychnos nux vomica)*
- 3.5.6. *Vasambu (Acorus calamus)*
- 3.5.7. *Kodiveli (Plumbago zeylanica)*
- 3.5.8. *Aamanakku (Ricinus communis)*

• **M3U6 Schedule E1 and Schedule J (Drugs and Cosmetics act, 1940)**

- 3.6.1. Schedule E1
- 3.6.2. Schedule J

• **M3U7 Magic remedies act (Drugs and Cosmetics act, 1940)**

- 3.7.1. Pollution control – Red, Orange, Green Category
- 3.7.2. Effluent Treatment Plant(ETP), Biochemical Oxygen Demand(BOD), Chemical Oxygen Demand(COD)
- 3.7.3. Aspects and Importance
- 3.7.4. Disposal of Metals, Minerals, bye products
- 3.7.5. Animal waste, Hospital waste management
- 3.7.6. Certification Process
- 3.7.8. Regulations

	• M3U8 Thogai sarakkugal 3.8.1. Classification as per T.V.Samabasivam Pillai 3.8.2. Classification as per Sigicharatna Deepam 3.8.3. Classification as per Marunthu sei Iyalum kalayum • M3U9 Introduction to plants of commercially important 3.9.1. <i>Amukkara (Withania somnifera)</i> 3.9.2. <i>Kumari (Aloe barbadensis)</i> 3.9.3. <i>Kadukkai (Terminalia chebula)</i> 3.9.4. <i>Thandrikkai (Terminalia bellerica)</i> 3.9.5. <i>Chukku (Zingiber officinale)</i> 3.9.6. <i>Nelli (Phyllanthus emblica)</i> 3.9.7. <i>Seenthil (Tinospora cardifolia)</i> 3.9.8. <i>Vilvam (Aegle marmelos)</i> 3.9.9. <i>Thanneervittan kizhangu (Asperagus racemosus)</i>					
4	M-4 Good Agriculture, Collection and Storage practices The module describes the steps to be adopted for Good Agriculture, Collection and Storage practices • M4U1 Good Agriculture Practices(GAP) 4.1.1. Identification/ Authentication of cultivated medicinal plants 4.1.2. Seeds and other propagation methods	2	10	20	30	60

- 4.1.3. Cultivation
- 4.1.4. Harvest
- 4.1.5. Personnel hygiene

- **M4U2 Good Collection Practices (GCP)**

- 4.2.1. Permission to collect
- 4.2.2. Technical planning
- 4.2.3. Selection of Medicinal plants for collection
- 4.2.4. Collection
- 4.2.5. Personnel Hygiene

- **M4U3 Post harvest processing**

- 4.3.1. Inspection and sorting
- 4.3.2. Primary processing
- 4.3.3. Drying
- 4.3.4. Specific processing
- 4.3.5. Processing facilities

- **M4U4 Bulk packing, labelling and storage**

- 4.4.1. Labelling
- 4.4.2. Storage practices

	• M4U5 Equipment 4.5.1. Materials 4.5.2. Design, construction and installation 4.5.3. Identification • M4U6 Quality Assurance 4.6.1. Quality Assurance Methods • M4U7 Documentation 4.7.1. Records 4.7.2. Authority and access to records • M4U8 Personnel 4.8.1. General 4.8.2. Health, Hygiene and Sanitation					
5	M-5 Cultivation methods The module describes the traditional and modern methods of cultivation of medicinal plants.	2	10	20	30	60

	• M5U1 Traditional methods of cultivation 5.1.1. Vegetative propagation 5.1.2. <i>In situ</i> conservation • M5U2 Modernized methods of cultivation of medicinal plants 5.2.1. <i>In vitro</i> regeneration 5.2.2. Vegetative propagation 5.2.3. Seed banks • M5U3 Tissue culture 5.3.1. Micropropagation 5.3.2. Somatic embryogenesis 5.3.3. Organogenesis					
6	M-6 Constrains in herbal drugs The module describes the list of RET species, International Union for Conservation of Nature (IUCN) Classification, wild life act, conservation measures to preserve them, Biodiversity act and its relationship to Intellectual Property Rights (IPR) and Miniata convention of Mercury • M6U1 Wildlife act 6.1.1. Implication of Wildlife act on Export, Research, Biotechnology, Cultivation, Conservation etc.,	1	5	10	15	30

- **M6U2 Minamata convention of Mercury**

6.2.1. The International agreement towards the use of Mercury and Mercurial Salts towards the Global Agreement on Environment and its current status and implications

- **M6U3 International Union for Conservation of Nature (IUCN) Classification**

6.3.1. Critically endangered

6.3.2. Endangered

6.3.3. Vulnerable

6.3.4. Near threatened

6.3.5. Data deficient

6.3.6. Not evaluated

- **M6U4 Rare, Endangered, Threatened (RET) Listed**

6.4.1. Rare, Endangered, Threatened (RET) Listed plants of India

- **M6U5 Biodiversity act**

6.5.1. Intellectual Property Rights

6.5.2. Conservation

6.5.3. Sustainable use of biological resources and/ or associated knowledge, and fair and equitable sharing of benefits arising out of the use of biological resources and knowledge associated thereto including the medicinal plants

7	M-7 Thathu Vaguppu (Metals, Minerals and Salts) The module describes the traditional classification, modern classification, purification, testing methods and vaippu (synthetic preparation) of thathu (Metals and Minerals) raw materials. • M7U1 Traditional classification 7.1.1. <i>Ulogam, Kaarasaaram, Paadanam, Uparasam</i> 7.1.2. <i>Panchabhootha Ulogangal</i> 7.1.3. Classification as per <i>Thasanga Vaidhya nigandu</i> 7.1.4. Classification of as per <i>Therayar Segarappa</i> 7.1.5. Classification as per <i>Bogar 7000</i> 7.1.6. Classification as per <i>Therayar venba</i> • M7U2 Classification as per Periodic table 7.2.1. Classification as per groups and periods as in periodic table • M7U3 Purification methods 7.3.1. General methods 7.3.2. <i>Theetchai seithal</i> 7.3.3. Purification by <i>Siddhar Therayar muraigal</i> • M7U4 Testing methods	2	10	20	30	60
---	---	---	----	----	----	----

- 7.4.1. Macroscopic geochemical properties
- 7.4.2. Microscopic methods
- 7.4.3. X Ray Diffraction methods
- 7.4.4. Physicochemical methods
- 7.4.5. Spectroscopic methods
- 7.4.6. Assay of elements
- 7.4.7. Sophisticated analytical instruments
 - 7.4.7.1 X Ray Diffraction (XRD)
 - 7.4.7.2 X Ray Fluorescence (XRF)
 - 7.4.7.3 Scanning Electron Microscope (SEM)
 - 7.4.7.4 Transmission Electron Microscope (TEM)
 - 7.4.7.5 Atomic Absorption Spectrometry (AAS)
 - 7.4.7.6 Fourier Transform Infrared Spectroscopy (FTIR)
 - 7.4.7.7 Nuclear Magnetic Resonance (NMR)
 - 7.4.7.8 Inductively Coupled Plasma Optical Emission Spectroscopy (ICP - OES)
 - 7.4.7.9 Inductively Coupled Plasma Mass Spectroscopy (ICP - MS)

• **M7U5 Vaippu muraigal**

- 7.5.1. Classification of vaippu muraigal
- 7.5.2. Types

• **M7U6 New additions**

- 7.6.1. *Rasavathakkal*
- 7.6.2. *Karumanal*
- 7.6.3. *Kalmatham*
- 7.6.4. *Karudapatchikkal*

	7.6.5. <i>Kurunthakkal</i> 7.6.6. <i>Chittakkal</i> 7.6.7. <i>Sukkankal</i>					
8	M-8 Jeeva Vaguppu (Zoological products) The module describes the traditional classification, Zoological classification, purification methods and nutritive values of some Siddha animal products • M8U1 Traditional classification 8.1.1. Milk: Cow, Goat, Buffalo, Human. 8.1.2. Hoof: Goat, Sheep, Horse, Buffalo. 8.1.3. Egg: Hen, Musuru (red ant). 8.1.4. Horns: Goat, Sheep, Deer 8.1.5. Bone: Goat 8.1.6. Meat: Goat, Hen, Fish (Kaili), Earthworm 8.1.7. <i>Korajanam</i> : Cow. 8.1.8. Ghee: Cow, Goat, Buffalo 8.1.9. Feathers: Hen 8.1.10. Honey: Honey and its types 8.1.11. Urine: Goat, Cow 8.1.12. Dung: Cow, Goat. 8.1.13. Blood: Hen, Rabbit. 8.1.14. Excretory product: <i>Kasthuri</i> • M8U2 Zoological classification	2	10	20	30	60

- 8.2.1. Milk: Cow, Goat, Buffalo, Human.
- 8.2.2. Hoof: Goat, Sheep, Horse, Buffalo.
- 8.2.3. Egg: Hen, Musuru (red ant).
- 8.2.4. Horns: Goat, Sheep, Deer
- 8.2.5. Bone: Goat
- 8.2.6. Meat: Goat, Hen, Fish (Kaili), Earthworm
- 8.2.7. *Korajanam* : Cow.
- 8.2.8. Ghee: Cow, Goat, Buffalo
- 8.2.9. Feathers: Hen
- 8.2.10. Honey: Honey and its types
- 8.2.11. Urine: Goat, Cow
- 8.2.12. Dung: Cow, Goat.
- 8.2.13. Blood: Hen, Rabbit.
- 8.2.14. Excretion: *Kasthuri*

• **M8U3 Purification methods**

- 8.3.1. Milk: Cow, Goat, Buffalo, Human.
- 8.3.2. Hoof: Goat, Sheep, Horse, Buffalo.
- 8.3.3. Egg: Hen, Musuru (red ant).
- 8.3.4. Horns: Goat, Sheep, Deer
- 8.3.5. Bone: Goat
- 8.3.6. Meat: Goat, Hen, Fish (Kaili), Earthworm
- 8.3.7. *Korajanam* : Cow.
- 8.3.8. Ghee: Cow, Goat, Buffalo
- 8.3.9. Feathers: Hen
- 8.3.10. Honey: Honey and its types
- 8.3.11. Urine: Goat, Cow
- 8.3.12. Dung: Cow, Goat.
- 8.3.13. Blood: Hen, Rabbit.
- 8.3.14. Excretion: *Kasthuri*

	• M8U4 Nutritive and therapeutic values of animal products 8.4.1. Milk and milk products 8.4.2. Poultry 8.4.3. Medicinally used meat					
9	M-9 Kadal porutkal (Marine Products) The module describes the traditional classification, Zoological classification and purification methods of some Siddha Marine products with special reference to Pavalam and Muthu. • M9U1 Traditional classification 9.1.1. Shells, Crab, fresh water muscle, Snail, Pearl oyster, Conch shell (<i>Sangu</i>) Common oyster • M9U2 Zoological classification 9.2.1. Shells, Crab, fresh water muscle, Snail, Pearl oyster, Conch shell (<i>Sangu</i>) Common oyster • M9U3 Availability and collection of Pavalam (Coral reefs) and varieties 9.3.1. Availability of <i>Pavalam</i>	1	5	10	15	30

	9.3.2. Macroscopic and Microscopic features of <i>Pavalam</i> • M9U4 Availability and collection of Muthu (Pearl)and varieties 9.4.1. Availability of <i>Muthu</i> 9.4.2. Macroscopic and Microscopic features of <i>Muthu</i>					
		16	80	160	240	480

Table 3 : Modules - Unit - Module Learning Objectives and Session Learning Objective- Notional Learning Hours- Domain-Level- TL Methods

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical training /experiential learning) session, the students should be able to)	3C Notional Learning Hours	3D Lecture/ Practical Training/ Experiential Learning	3E Domain/ Sub Domain	3F Level (Does/Shows how/Knows how/Know)	3G Teaching Learning Methods
Module 1 : Marunthugalin peyaridal matrum vagaippadu(Basics, Nomenclature, and classification of drugs)						
Module Learning Objectives (At the end of the module, the students should be able to)						
Describe the history of Gunapadam, nomenclature and classification of drugs and the types of medications and standard operating procedures adopted in pharmaceuticals. Conduct literature review on the nomenclature and classification of drugs as per various siddhars theory. Identify the drugs based on the nomenclature, different dosage forms of medicines.						
Unit 1 History of Gunapadam (Siddha Materia Medica)						
1.1.1 Documentation of herbs by various Siddhars 1.1.2 Works of various Siddhars on Medicinal plants 1.1.3 Role of Sambasivam Pillai, Kannusamiyam in Siddha Materia Medica 1.1.4 Evolution of <i>Patharthagunasindamani</i> to Gunapadam 1.1.5 Gunapadam to Pharmacopoeias						
References: 19,21,34,40,42,43						

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3,CO4,CO5	Analyze the evolution of Siddha Gunapadam from various Siddhars concepts to the development of Siddha Pharmacopeia and the role of different Siddhars.	1	Lecture	CAN	Knows-how	L,DIS
CO1,CO2,CO3,CO4,CO5	Describe the role of Sambasivampillai in defining the raw drugs.	1	Lecture	CC	Knows-how	L
CO1,CO2,CO3,CO4,CO5	Review the Literature collection from various libraries on evolution of use of drugs in Siddha system of medicine.	6	Experiential-Learning 1.1	CC	Knows-how	LS

Unit 2 .Nomenclature

- 1.2.1. *Siddhar Therayar* theory
- 1.2.2. *Siddhar Agathiyar* theory
- 1.2.3. *Siddhar Bogar* theory
- 1.2.4. *Kannusamiyam* theory
- 1.2.5. *Siddhar Yuhimuni* theory
- 1.2.6. *Siddhar Thirumoolar* concepts

References: 6,10,18,19,21,34,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3,CO4,CO5	Describe the different nomenclature used by different Siddhars, rationale and compare the different nomenclature used for the same drug by different Siddhars.	2	Lecture	CC	Knows-how	L,L&GD
CO1,CO2,CO3,CO4,CO5	Compile the literature from various libraries and characterize and analyze the different nomenclature of drugs.	6	Experiential-Learning 1.2	CAP	Does	LS

Unit 3 Types of Internal and External medicines with their shelf life

- 1.3.1. 32 Types of *ulmarunthugal* (Internal medicines)
- 1.3.2. 32 Types of *Puramarunthugal* (External medicines)
- 1.3.3. Processes involved in preparing Internal and External medicines
- 1.3.4. Shelf life of *Ulmarunthugal*- Gunapadam and AYUSH guidelines
- 1.3.5. Shelf life of *Puramarunthugal*- Gunapadam and AYUSH guidelines
- 1.3.6. *Karuvigal and Iyanthirangal*

References: 20,21,34,35,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3 ,CO4,CO5	Describe the types and methods of preparation of <i>Ulmarunthugal</i> (internal) and <i>Puramarunthugal</i> (external) medicines with their shelf life as per Gunapadam and Ayush guidelines.	1	Lecture	CC	Knows-how	PBL,L&P PT ,L&GD
CO1,CO2,CO3 ,CO4,CO5	Describe the <i>Karuvigal</i> and <i>Iyanthirangal</i> used in the preparation and their applications with specific examples.	2	Lecture	CC	Knows-how	L_VC,L& PPT
CO1,CO2,CO3 ,CO4,CO5	Identify the various dosage forms and instruments used in preparing the medicine.	10	Practical Training 1.1	PSY- GUD	Shows-how	D
CO1,CO2,CO3 ,CO4,CO5	Participate in visit to Siddha pharmaceuticals for studying the various Standard Operating Procedures(SOP's) adopted for the manufacture of Internal and External medicines	7	Experiential- Learning 1.3	CAP	Does	FV

Unit 4 Classification of Drugs

- 1.4.1. Classification as per traditional methods of Herbal Drugs.
 - 1.4.1.1. Plants classified based on Habitat
 - 1.4.1.2.Plants classified based on *Suvai, Thanmai and Pirivu*
 - 1.4.1.3. Plants classified based on parts used
 - 1.4.1.4 Plants classified based on actions
 - 1.4.1.5 .Plants classified based on presence of metals like Iron, Copper, Lead.

- 1.4.1.6. Basic classification of *Thathu porutkal* with *Panchabootha thathuvam*.
 1.4.1.7. Classification of *Jeeva porutkal* (Animal and its byproducts)
 1.4.2. Classification based on *Natpu sarakku*, *Pagai sarakku*
 1.4.2.1. *Ayam* (Iron)
 1.4.2.2. *Karuvangam*(Lead)
 1.4.2.3. *Sembu* (Copper)
 1.4.2.4. *Naagam* (Zinc)
 1.4.2.5. *Thangam* (Gold)
 1.4.2.6. *Rasam* (Mercury)
 1.4.2.7. *Ganthagam* (Sulphur)
 1.4.2.8. *Pachai karpooram* (Borneo camphor)
 1.4.2.9. *Thurusu* (Copper sulphate)
 1.4.3. Modern classification (*Mooligai*, *Thathu* and *Jeevam*)
 1.4.3.1. Binomial classification, Zoological classification.
 1.4.3.2. Classification of medicinal plants from important families
 1.4.3.3. Medicinally used greens
 1.4.3.4. Pharmacopoeia classification
 1.4.3.5. Regional classification
 1.4.3.6. Disease wise classification

References: 1,2,16,17,20,22,23

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3 ,CO4,CO5	Elaborate the categorization of the herbs based on their Pharmacological actions, habit, part used, presence of elements in them and by modern classification.	1	Lecture	CC	Knows-how	L&PPT ,DIS,L_V C
CO1,CO2,CO3 ,CO4,CO5	Describe the categorization of <i>thathu</i> (Metal and minerals) and <i>jeeva porutkal</i> (Animal and its by products) by traditional method.	1	Lecture	CC	Knows-how	L&PPT ,L,DIS
CO1,CO2,CO3	Describe in detail <i>Natpu sarakku</i> and <i>pagai sarakkugal</i> of the following:	1	Lecture	CC	Knows-	L&PPT ,L

,CO4,CO5	<i>Ayam</i> (Iron) <i>Karuvangam</i> (Lead) <i>Sembu</i> (Copper) <i>Naagam</i> (Zinc) <i>Thangam</i> (Gold) <i>Rasam</i> (Mercury) <i>Ganthagam</i> (Sulphur) <i>Pachai karpooram</i> (Borneo camphor) <i>Thurusu</i> (Copper sulphate)				how	
CO1,CO2,CO3 ,CO4,CO5	Identify the raw drugs based on organoleptic characters and describe the applied clinical applications of drugs	10	Practical Training 1.2	CC	Shows-how	DL,D
CO1,CO2,CO3 ,CO4,CO5	Participate in visit to farms collect raw materials (specific plants, ores, and animal products)	7	Experiential-Learning 1.4	PSY-GUD	Does	FV

Practical Training Activity

Practical Training 1.1 : Identify the dosage form

Total hrs: 10

Activity 1- Demonstration (3 hrs)

The teacher should elaborate and demonstrate the use of different instruments used in preparing different dosage forms and their importance in clinical applications and specified standards for that dosage form.(20 numbers)

Activity 2- Identification of spotter(7hrs)

The students should identify the given dosage form of the spotter and describe the dosage form, instruments used, shelf life and its preparation.

1. Identify the spotter and its dosage form
2. Describe the appearance, composition and intended use
3. Name the tools or devices used to prepare the dosage form
4. Mention the shelf life of the dosage form.
5. Specify the test to know the quality standard of the dosage form

Practical Training 1.2 : Identification of raw drugs

Total hrs : 10

Activity 1-Demonstration by teacher (3 hrs)

Teacher should elaborate the key identification features of the raw drugs with respect to organoleptic characters

Activity 2- Identification by students (7 hrs)

Identify the drugs given as spotters (3 hrs)

Describe the morphological characters and identification features (3 hrs)

Describe the clinical applications of the drug (1 hr)

20 number of drugs can be kept as spotters

Experiential learning Activity

Experiential-Learning 1.1 : Literature collection on evolution of Siddha drugs

Total activity hrs: 6

Activity 1- Collection of literature (4 hrs)

1. Literature collection on the use of various drugs, evolution of use of drugs in Siddha system of medicine and understanding the development of evolution of materia medica in Siddha system from nigandu, pathartha guna vilakam to pharmacopoeia sourced from variety of repositories

Activity 2- Compilation of the literature (2 hrs)

2. Compilation of drugs mentioned in classical texts of Siddhars and understanding the use of the drugs

Experiential-Learning 1.2 : Literature collection on nomenclature of drugs

Total activity hrs: 6

Activity 1- Collection of literature (4 hrs)

The students should visit different libraries to collect literature on different nomenclatures used in different literatures advocated by different siddhars and different school of thoughts

Activity 2- Compilation and report submission (2 hrs)

Compile and submit a report on the different nomenclature used for the drugs and their rationale sourced from various libraries.

Experiential-Learning 1.3 : Standard Operating Procedures

Total activity hrs: 7

Activity 1- Field visit (3hrs)

Industrial visit to Siddha pharmaceuticals for studying the various Standard Operating Procedures (SOP's) adopted for the manufacture of internal and external medicines.

Activity 2- Facility inspection (3hrs)

Inspect the facility to know the instruments, machinery, space and the standards needed for the preparation of various dosage forms

Activity 3- Studying the Records and documents (1 hr)

Study the required documents and records needed for regulatory purposes for the manufacture of different drugs and record them in the log book (1 hr)

Experiential-Learning 1.4 : Collection of raw drugs

Total activity hrs : 7 hrs

Activity 1- Field visit (7 hrs)

Collection of raw drugs (specific plants, ores, and animal products) to understand the classification of the drugs, part used, modern classification etc

Collection and identification of herbal raw drugs (3 hrs)

Collection and identification of mineral based raw drugs (2 hrs)

Collection and identification animal based raw drugs (2 hrs)

Modular Assessment**Assessment method****Hour**

Conduct a structured Modular assessment. Assessment will be for 50 marks . Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C.

CHOOSE ANY OF THE BELOW ASSESSMENT FOR 50 MARKS

Assessment can be made by class presentations or by group discussions on the following topics.

1. Nomenclature drugs (10 marks)

2. Classification of drugs (20 marks)

3. Dosage forms (20 marks)

or

4

Any practical in converted form can be taken for assessment. (25 Marks)

and

Any of the experiential as portfolios/reflections/presentations can be taken as an assessment. (25 Marks)

Module 2 : Marunthagaviyal (Pharmacopoeias)

Module Learning Objectives

(At the end of the module, the students should be able to)

Describe the parameters used in Indian and International pharmacopoeia and the quality standards described in the guidelines.
Conduct extensive research on the drugs used in AYUSH systems, similarities and properties.
Identify the quality parameters for drugs as per the pharmacopoeia and guidelines.

Unit 1 Indian Pharmacopoeias

- 2.1.1. Siddha Pharmacopoeia of India
- 2.1.2. Ayurveda Pharmacopoeia of India
- 2.1.3. Unani Pharmacopoeia of India
- 2.1.4. Homeopathy Pharmacopoeia of India
- 2.1.5. Indian Pharmacopoeia
- 2.1.6. Food Safety and Standard Authority of India

References: 16,34,41,42,43

3A	3B	3C	3D	3E	3F	3G
CO3,CO4,CO7	Describe the importance of pharmacopoeia, its role in identification and standardisation of crude drugs.	1	Lecture	CC	Knows-how	L,L&PPT
CO3,CO4,CO7	Elaborate the different parameters used to define the plant/mineral with reference to identification of the drugs.	1	Lecture	CC	Knows-how	DIS,L,L&PPT

CO3,CO4,CO7	Compare the use of herbal/ mineral drugs available in Ayush systems of medicine.	1	Lecture	CC	Knows-how	L&GD,L
CO3,CO4,CO7	Conduct Research and comparison of various parameters mentioned in Ayush pharmacopoeias	5	Practical Training 2.1	CAN	Shows-how	LS
CO3,CO4,CO7	Participate in visit to Research councils/ PCIM to learn the processes in documentation and developmental steps in publishing pharmacopoeias	10	Experiential-Learning 2.1	CAP	Does	FV

Unit 2 International Pharmacopoeias

- 2.2.1. British Herbal Pharmacopoeia
- 2.2.2. United states Pharmacopoeia
- 2.2.3. European Union Pharmacopoeia
- 2.2.4. Chinese pharmacopoeia
- 2.2.5. Japanese Herbal Pharmacopoeia

References: 28

3A	3B	3C	3D	3E	3F	3G
CO3,CO4,CO7	Elaborate the standards prescribed for crude drugs in different international pharmacopoeia.	1	Lecture	CC	Knows-how	L&PPT ,LS,L&GD
CO3,CO4,CO7	Identify the similar drugs used in Ayush and other traditional system of medicines abroad.	1	Lecture	CC	Knows-how	LS
CO3,CO4,CO7	Analyze the qualitative and quantitative methods at international scenario in the current research.	1	Lecture	CAN	Shows-how	LS,DIS,L &PPT
CO3,CO4,CO7	Conduct research and compare the Quality aspects mentioned in international	5	Practical	CAN	Knows-	D,SDL,D

	pharmacopoeias with special reference to Chinese pharmacopoeia to improve research skill and become a good researcher.		Training 2.2		how	L
--	--	--	--------------	--	-----	---

Unit 3 Quality standards

- 2.3.1. Pharmacopoeia Commission for Indian Medicine (PCIM)
- 2.3.2. AYUSH Guidelines
- 2.3.3. Drug Controller General of India (DCGI)
- 2.3.4. Indian Council for Medical Research (ICMR)
- 2.3.5. National Medicinal Plant Board (NMPB)
- 2.3.6. Bureau of Indian Standards (BIS)
- 2.3.7. Drugs and Cosmetics act, 1940
- 2.3.8. Quality Council of India (QCI)

References: 9,28,50

3A	3B	3C	3D	3E	3F	3G
CO3,CO4,CO7	Describe the different guidelines that specifies the quality standards of raw materials.	1	Lecture	CC	Knows-how	L&PPT ,L
CO3,CO4,CO7	Describe the different techniques involved in standardisation of raw materials and their applications .	2	Lecture	CC	Knows-how	L,PBL,L_V VC
CO3,CO4,CO7	Discuss the regulatory aspects pertaining to the raw materials.	1	Lecture	CC	Knows-how	L&GD,Pr BL
CO3,CO4,CO7	Conduct research and submit report on quality standards of crude drugs used in various guidelines	10	Practical Training 2.3	CAN	Shows-how	D,SDL,L S
CO3,CO4,CO7	Participate in visit to Ayush pharmaceuticals to understand the implementation of quality standards pertaining to crude drugs	10	Experiential-Learning 2.2	CAN	Shows-how	TBL,FV

CO3,CO4,CO7	Participate in visit to Ayush pharmaceuticals to witness the instruments used to maintain the quality standards pertaining to crude drugs	6	Experiential-Learning 2.3	CAP	Does	FV
Practical Training Activity						
Practical Training 2.1 : Quality control parameters in Ayush pharmacopoeias						
Total activity hrs: 5 Activity 1- Demonstration by teacher (1 hr) The teacher should elaborate the specifications and quality aspects of crude drugs mentioned in Indian and International pharmacopoeias Activity 2- Research report by student (4 hrs) The students should submit a report by doing a research and compare the quality aspects of Indian pharmacopoeia and International pharmacopoeia with a special reference to Chinese pharmacopoeia						
Practical Training 2.2 : Quality aspects in International pharmacopoeia						
Total activity hrs: 5 Activity 1- Demonstration by teacher (2 hrs) The teacher should demonstrate the quality parameters of crude drugs in International pharmacopoeias and their importance Activity 2- Research report submission by student (3 hrs) The students should submit a report by doing a research and compare the quality aspects of Indian pharmacopoeia and International pharmacopoeia with a special reference to Chinese pharmacopoeia						
Practical Training 2.3 : Quality standards of raw drugs in guidelines						
Total activity hrs : 10 Activity 1- Demonstration by teacher (3 hrs) The teacher will demonstrate the quality standards for crude drugs with examples Activity 2- Submission of research report (7 hrs) The students should submit a research report on the various parameters used as quality standards for crude drugs with respect to different guidelines on the following basis 1. Pharmacopoeia standards (2 hrs) 2. Analytical standards (3 hrs)						

3. Traditional standards (2 hrs)

Experiential learning Activity

Experiential-Learning 2.1 : Development of pharmacopoeia

Total activity hrs: 10

Activity 1- Visit to research councils (6 hrs)

Visit to Research councils or Pharmacopoeia Commission of Indian Medicine(PCIM) to learn the processes in documentation and developmental steps in publishing pharmacopoeias.

Activity 2- Analyze Monograph (3 hrs)

Analyze the monographs published and the quality parameters used in them.

Activity 3- Document key steps in monograph preparation (1 hr)

Discuss and document the key steps in publishing monographs and pharmacopoeias

Experiential-Learning 2.2 : Quality standards of raw drugs

Total activity hrs :10

Activity 1- Field visit (7 hrs)

Visit to Ayush pharmaceuticals to understand the implementation of quality standards pertaining to crude drugs used for quality control purposes.

Activity 2- Team discussion (3 hrs)

Discuss in team and interact with technical head about the quality control measures used in the facility

Experiential-Learning 2.3 : Instruments to maintain Quality standards of raw drugs

Total activity hrs: 6

Activity 1- Field visit (4 hrs)

Visit to Ayush pharmaceuticals to witness the instruments, records, equipments used to maintain quality standards pertaining to crude drugs used for quality control purposes.

Activity 2- Documenting analytical specification (4 hrs)

Learn and document in log book on the standards set and the analytical specifications of the crude drugs in the facility (1.5 hrs)

Activity 3- Assessment by discussion (0.5 hr)

Assessment can be made by one to one discussion with students on quality control procedures

Modular Assessment

Assessment method

Hour

Conduct a structured Modular assessment. Assessment will be for 50 marks . Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C.

CHOOSE ANY OF THE BELOW ASSESSMENT FOR 50 MARKS

Assessment can be made by theory based structured questions or by viva in the following topics.

1, Parameters used as quality standards in different pharmacopoeia.(25 marks)

2. Parameters used in the identification of crude drugs in pharmacopoeia.(25 marks)

or

Any practical in converted form can be taken for assessment. (25 Marks)

and

Any of the experiential as portfolios/reflections/presentations can be taken as an assessment. (25 Marks)

4

Module 3 : Mooligai vaguppu (Herbal drugs)

Module Learning Objectives

(At the end of the module, the students should be able to)

Describe the distributions, substitutes, purification, collection, processing and about commercially important medicinal plants.
Conduct different purification methods of medicinal plants.
Identify the adulterants and substitutes.

Unit 1 Distribution and availability

3.1.1. Distribution and availability of Herbal drugs- Indian scenario
3.1.2. Distribution and availability of Herbal drugs- International scenario

References: 5,12,17,30,32,37,51

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO6	Describe the distribution and availability of Herbal drugs in Indian scenario and International scenario	1	Lecture	CC	Knows-how	L,L&PPT
CO1,CO2,CO3,CO6	Participate in field visit to collect a detailed survey of distribution of medicinal plants in particular district	2	Experiential-Learning 3.1	AFT-RES	Does	FV

Unit 2 Challenges and limitations

3.2.1. Geographical variation

- 3.2.2. Collection of raw materials free of diseases
- 3.2.3. Variation in phytochemicals based on seasons and plant parts
- 3.2.4. Pesticide residues in Medicinal plants
- 3.2.5. Microbial contamination in medicinal plants
- 3.2.6. Heavy metal contamination

References: 5,7,16,22,23,25,29

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3 ,CO6	Describe the Geographical variation in plants and the methods of collection of raw materials	1	Lecture	CC	Knows-how	L,DIS,L_ VC,L&PP T
CO1,CO2,CO3 ,CO6	Demonstrate the Microbial count assay	3	Practical Training 3.1	PSY- GUD	Shows-how	D,DIS,L, DA,DL
CO1,CO2,CO3 ,CO6	Participate in visit to Botanical gardens, Medicinal plants cultivation centres, Seed banks	5	Experiential- Learning 3.2	CC	Does	ML,FV,D G

Unit 3 Authentication, Substitutes, Alternatives

- 3.3.1. Authentication by traditional methods
- 3.3.2. Authentication by pharmacopoeia standards
- 3.3.3. Drugs used as substitutes
- 3.3.4. Drugs used as alternatives

References: 16,21,38,42,43,50

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3,CO6	Describe the different authentication methods mentioned in traditional literature and by pharmacopoeia standards and identify the adulterants.	1	Lecture	CC	Knows-how	L&PPT ,L
CO1,CO2,CO3,CO6	Identify the specific drugs using Pharmacopoeia standards especially by Macroscopic characters.	4	Practical Training 3.2	CAN	Shows-how	DL,D
CO1,CO2,CO3,CO6	Participate in visit to Ayush accredited Drug testing labs to witness the microscopic and sophisticated techniques to identify the adulterants.	7	Experiential-Learning 3.3	CC	Does	DL,D,FV

Unit 4 Specific collection and processing methods

3.4.1. *Seenthil (Tinospora cordifolia)*

3.4.2. *Erukku (Calotropis gigantea)*

3.4.3. *Vasambu (Acorus calamus)*

3.4.4. *Poondur (Allium sativum)*

3.4.5. *Chukku (Zingiber officinale)*

3.4.6. *Aamanakku ennai (Ricinus communis)*

3.4.7. *Pachai ennai – Ootrina ennai*

3.4.8. *Mooligai uppukkal (Herbal salts)*

References: 2,16,17,35,36,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3,CO6	Describe the specific collection and processing methods of the following herbs and oils. <i>Seenthil (Tinospora cordifolia)</i> <i>Erukku (Calotropis gigantea)</i> <i>Vasambu (Acorus calamus)</i> <i>Poondur (Allium sativum)</i>	1	Lecture	CC	Knows-how	L,L&GD

	<i>Chukku</i> (Zingiber officinale) <i>Aamanakku ennai</i> (Ricinus communis) <i>Pachai ennai – Ootrina ennai</i> <i>Mooligai uppukkal</i> (Herbal salts)					
CO1,CO2,CO3 ,CO6	Prepare pachai ennai and ootrina ennai as per traditional methods.	4	Practical Training 3.3	PSY- GUD	Shows- how	D,DL
CO1,CO2,CO3 ,CO6	Conduct Questionnaire based survey with plant collection and suppliers to document feasible methods of collection of plants	3	Experiential- Learning 3.4	CC	Knows- how	FV

Unit 5 Purification and scientific rationale

- 3.5.1. *Serankottai* (*Semecarpus anacardium*)
- 3.5.2. *Nervalam* (*Croton tiglium*)
- 3.5.3. *Kungiliyam* (*Shorea robusta*)
- 3.5.4. *Thetran* (*Strychnos potatorum*)
- 3.5.5. *Etti* (*Strychnos nux vomica*)
- 3.5.6. *Vasambu* (*Acorus calamus*)
- 3.5.7. *Kodiveli* (*Plumbago zeylanica*)
- 3.5.8. *Aamanakku* (*Ricinus communis*)

References: 1,20,21,30,34,35,36,44

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3 ,CO6	Describe the purification methods of the following herbs and explore the scientific rationale in the process of purification. <i>Serankottai</i> (<i>Semecarpus anacardium</i>) <i>Nervalam</i> (<i>Croton tiglium</i>) <i>Kungiliyam</i> (<i>Shorea robusta</i>)	2	Lecture	CC	Knows- how	D-M,L& GD,L

	<i>Thetran (Strychnos potatorum)</i> <i>Etti (Strychnos nux vomica)</i> <i>Vasambu (Acorus calamus)</i> <i>Kodiveli (Plumbago zeylanica)</i> <i>Aamanakku (Ricinus communis)</i>					
CO1,CO2,CO3,CO6	Demonstrate the different purification methods used to purify single toxic plant	4	Practical Training 3.4	PSY-GUD	Shows-how	D
CO1,CO2,CO3,CO6	Conduct research on the publications on scientific validation of the different phytochemical changes that happen before and after purification in toxic drug	2	Practical Training 3.5	PSY-GUD	Shows-how	LS,L_VC
CO1,CO2,CO3,CO6	Participate in visit to traditional vaidhyars to learn about unique processing procedures and apply them in medicine preparation.	4	Experiential-Learning 3.5	PSY-GUD	Does	D,FV

Unit 6 Schedule E1 and Schedule J (Drugs and Cosmetics act, 1940)

- 3.6.1. Schedule E1
3.6.2. Schedule J

References:

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3,CO6	Describe the drugs in Schedule E1 and the features of Schedule J and its importance	1	Lecture	CC	Knows-how	L,L&GD

Unit 7 Magic remedies act (Drugs and Cosmetics act, 1940)

- 3.7.1. Pollution control – Red, Orange, Green Category
3.7.2. Effluent Treatment Plant(ETP), Biochemical Oxygen Demand(BOD), Chemical Oxygen Demand(COD)
3.7.3. Aspects and Importance
3.7.4. Disposal of Metals, Minerals, bye products

3.7.5. Animal waste, Hospital waste management
 3.7.6. Certification Process
 3.7.8. Regulations

References:

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3,CO6	Identify Misleading advertisements .Describe the measures to prohibit the Misleading Advertisements.	1	Lecture	CC	Knows-how	L,PSM,L &PPT
CO1,CO2,CO3,CO6	Collect the Misleading Advertisements and understanding the role of AYUSH and Advertising Standards Council of India (ASCI).	3	Practical Training 3.6	CC	Shows-how	DIS,CBL,LS
CO1,CO2,CO3,CO6	Review on the on the measures takes in curtailing the MISleading Advertisement and action taken on case basis.	3	Experiential-Learning 3.6	CAN	Does	CBL,TBL,LS

Unit 8 Thogai sarakkugal

3.8.1. Classification as per T.V.Samabasivam Pillai
 3.8.2. Classification as per Sigicharatna Deepam
 3.8.3. Classification as per Marunthu sei Iyalum kalayum

References: 19,20,21,34

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3,CO6	Classify the Thogai sarakkugal as per T.V.Samabasivam Pillai, Sigicharatna Deepam, Marunthu sei Iyalum kalayum	1	Lecture	CC	Knows-how	DIS,L&PPT ,L

Unit 9 Introduction to plants of commercially important

- 3.9.1. *Amukkara (Withania somnifera)*
- 3.9.2. *Kumari (Aloe barbadensis)*
- 3.9.3. *Kadukkai (Terminalia chebula)*
- 3.9.4. *Thandrikkai (Terminalia bellerica)*
- 3.9.5. *Chukku (Zingiber officinale)*
- 3.9.6. *Nelli (Phyllanthus emblica)*
- 3.9.7. *Seenthil (Tinospora cardifolia)*
- 3.9.8. *Vilvam (Aegle marmelos)*
- 3.9.9. *Thanneervittan kizhangu (Asperagus racemosus)*

References: 2,16,17,21,22,23,34

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO3 ,CO6	Describe the commercial importance of the following medicinal plants and their importance in export. <i>Amukkara (Withania somnifera)</i> <i>Kumari (Aloe barbadensis)</i> <i>Kadukkai (Terminalia chebula)</i> <i>Thandrikkai (Terminalia bellerica)</i> <i>Chukku (Zingiber officinale)</i> <i>Nelli (Phyllanthus emblica)</i> <i>Seenthil (Tinospora cardifolia)</i> <i>Vilvam (Aegle marmelos)</i> <i>Thanneervittan kizhangu (Asperagus racemosus)</i>	1	Lecture	CC	Knows-how	BS,DIS,BL
CO1,CO2,CO3 ,CO6	Participate in field visit to medicinal plant garden, Agriculture University, MAPA visit and to nearby hills to identify commercially important plants , their cultivation and	2	Experiential-Learning 3.7	PSY-GUD	Does	DG,FV,PL

propagation methods.

Practical Training Activity

Practical Training 3.1 : Total microbial count of chooranam

Total activity hrs : 3

Activity 1- Demonstration by teacher (1.5 hrs)

The teacher will demonstrate the total microbial count assay for one chooranam

Activity 2- Demonstration of assay by student (1.5 hrs)

Student should be assessed by giving them experiment of total microbial count assay as per PLIM guidelines with any one of the chooranam. Amukara chooranam, Thripala chooranam, Nilavagai chooranam.

Practical Training 3.2 : Identification of drugs by macroscopic method

Total activity hrs: 4

Activity 1- Demonstration by teacher (2 hrs)

The teacher will demonstrate the macroscopic characters of the drugs. 10 to drugs can be demonstrated

Activity 2- Identification of spotters (2 hrs)

The students should identify given spotters using the Pharmacopoeia standards especially by macroscopic characters and identify the adulterant.

1. Identify the given spotter (1 hr)

2. Note the macroscopic characters. (30 mins)

3. Write the name of the Adulterant for it (30 mins)

Practical Training 3.3 : Preparation of pachai ennai and ootrina ennai

Total activity hrs: 4

Activity 1- Demonstration by teacher (2 hrs)

The teacher will demonstrate the preparation of pachai ennai and ootrina ennai.

Activity 2- Preparation by student (2 hrs)

The students should prepare the castor oil by 2 classical methods namely pachai ennai and ootrina ennai method.

1. Demonstrate the procedure of preparation (1.5 hrs)

2. Interpret the changes noted during the preparation (30 mins)

Practical Training 3.4 : Demonstration of purification methods

Total activity hrs: 4

Activity 1- Demonstration by teacher (1 hr)

The teacher will demonstrate two different purification of one drug

Activity 2- Demonstration by student (3 hrs)

The student should demonstrate at least 2 different methods of purifications of one toxic medicinal plant.

1. Demonstrate 2 different methods of purifications (2 hrs)

2. Compare the organoleptic changes that happen before and after purification (1 hr)

Practical Training 3.5 : Phytochemical changes in purification methods

Total activity hrs: 2

Activity 1- Lecture with vedio clips by teacher (1 hr)

The teacher will elaborate the phytochemical changes before and after purification of a drug by simple methods like organoleptic changes.

Activity 2- Research report submission (1 hr)

The student should submit a research report based on the publications on the scientific validation of the different phytochemical changes that happens Before & After purification of any one of the toxic medicinal plants.

Practical Training 3.6 : Collection of Misleading Advertisements

Total activity hrs : 3

Activity 1- Case study by teacher (1.5 hrs)

The teacher will be elaborating with case studies on atleast 5 misleading advertisements and the false claims

Activity 2- Collection of Misleading Advertisements by students (1.5 hrs)

The students should collect atleast 2 different misleading advertisements and report the false claim in the advertisements and the role of Ayush and advertising standards

council of India in curbing the misleading advertisements.

Experiential learning Activity

Experiential-Learning 3.1 : Distribution of medicinal plants

Total activity hrs: 2

Activity 1- Field visit (1.5 hrs)

Field visit to collect a detailed survey of distribution of medicinal plants in particular district to understand the distribution of medicinal plants of that district.

Activity 2- Documentaion of distribution of plants (30 mins)

Record the distribution of medicinal plants in the log note book

Experiential-Learning 3.2 : Conservation of medicinal plants

Total activity hrs: 5

Activity 1- Field visit (4 hrs)

Visit to Botanical gardens, Medicinal plants cultivation centres, Seed banks to witness the various measures to preserve the plants to avoid contamination.

Activity 2- Team discussion (1 hr)

Interact and discuss in team and record the salient methods in conservation of medicinal plants

Experiential-Learning 3.3 : Drug identification by microscopic methods and instruments

Total activity hrs: 7

Activity 1- Demonstration of extraction methods (3 hrs)

Demonstration of extraction methods, microscopic techniques, distillation, value addition, isolation, identification of crude drugs

Activity 2- Demonstration of the instruments (4 hrs)

1. Thin Layer Chromatography (TLC)

2. High Performance Thin Layer Chromatography (HPTLC),

3. High Performance Liquid Chromatography (HPLC)

4. Gas Chromatography (GC), Gas Chromatography Mass Spectrometry (GC-MS), Liquid Chromatography Mass Spectrometry LC-MS,

5. Spectral studies including UV - Visible spectroscopy, Infra Red spectroscopy, and their applications in authentication of a drug, finding adulteration and substitutes.

Experiential-Learning 3.4 : Plant collection methods

Total activity hrs: 3

Activity 1- Questionnaire based Survey (2 hrs)

Questionnaire based survey with local plant collection and suppliers to document feasible methods of collection of plants and know the distribution of the medicinal plants, seasonal availability.

Activity 2- Report submission (1 hr)

Submit a report on the feasible methods of collection, seasonal availability of the raw drugs

Experiential-Learning 3.5 : Purification methods by traditional vaidhyars

Total activity hrs: 4

Activity 1- Field visit (3hrs)

Visit to traditional vaidhyars to learn about unique processing methods not mentioned in the literature and the rationale in using the method for the purification

Activity 2- Documenting the feasible methods (1 hr)

Compare and discuss with that of methods given in the classical texts for their feasibility.

Experiential-Learning 3.6 : Misleading Advertisements

Total activity hrs : 3

Activity 1- Identification of misleading claims (2 hrs)

The students will be given various Misleading Advertisements and asked to identify the misleading claims as group activity

Activity 1- Research report writing (1 hr)

Review and report on the measures taken in curtailing the Misleading Advertisement by doctors and action taken on case basis..

Experiential-Learning 3.7 : Cultivation and propagation methods.

Total activity hrs: 2

Activity 1- Field visit (2 hrs)

Visit medicinal plant garden, Agriculture University, or to nearby hills to identify commercially important plants , their cultivation and propagation methods and document the key points in log book.

Modular Assessment

Assessment method

Hour

Conduct a structured Modular assessment. Assessment will be for 50 marks . Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C.

CHOOSE ANY OF THE BELOW ASSESSMENT FOR 50 MARKS

Assessment to be done by question and answers pattern on the following topics.

1. Authentication and adulteration (15 marks)
2. Collection and processing of raw drugs (10 marks)
3. Purification methods (15 marks)
4. Commercially important plants (10 marks)

or

Any practical in converted form can be taken for assessment. (25 Marks)

and

Any of the experiential as portfolios/reflections/presentations can be taken as an assessment. (25 Marks)

4

Module 4 : Good Agriculture, Collection and Storage practices

Module Learning Objectives

(At the end of the module, the students should be able to)

Describe the steps to be adopted for Good Agriculture, Collection and Storage practices

Collect the medicinal plants using the Good Collection Practices.

Identify the common pests using microscopic technique, foreign matter, mixups etc

Unit 1 Good Agriculture Practices(GAP)

4.1.1. Identification/ Authentication of cultivated medicinal plants

4.1.2. Seeds and other propagation methods

4.1.3. Cultivation

4.1.4. Harvest

4.1.5. Personnel hygiene

References: 11,14,15,21,24,25,26

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO6	Elaborate the processes involved in Identification/ Authentication of cultivated medicinal plants, propagation methods, Cultivation, and harvest methods	2	Lecture	CC	Knows-how	L,I&PPT
CO2,CO3,CO6	Collect and compare samples from markets and analysis and documenting.	3	Practical Training 4.1	CC	Knows-how	DL,D

CO2,CO3,CO6	Participate in visit to farmland attached to pharmaceutical practising GAP and using the raw materials for product development	7	Experiential-Learning 4.1	CC	Does	FV
Unit 2 Good Collection Practices (GCP) 4.2.1. Permission to collect 4.2.2. Technical planning 4.2.3. Selection of Medicinal plants for collection 4.2.4. Collection 4.2.5. Personnel Hygiene References: 11,14,15,21,24,25,26						
3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO6	Describe the steps and methods involved in Good cultivation practices.	2	Lecture	CC	Knows-how	L,L&PPT
CO2,CO3,CO6	Collect the herbs applying the Good Collection Practices (GCP)	4	Practical Training 4.2	PSY-ADT	Shows-how	D,DG,TB L
Unit 3 Post harvest processing 4.3.1. Inspection and sorting 4.3.2. Primary processing 4.3.3. Drying 4.3.4. Specific processing 4.3.5. Processing facilities						

References: 11

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO6	Describe different methods of inspection and sorting, Primary processing, drying and Specific processing	1	Lecture	CC	Knows-how	L,L&PPT
CO2,CO3,CO6	Conduct research and submit assignments on different drying methods of leaves	5	Practical Training 4.3	CC	Shows-how	LS
CO2,CO3,CO6	Participate in visit to farm facility to learn different processing methods of crude drugs	7	Experiential-Learning 4.2	CAP	Does	FV

Unit 4 Bulk packing, labelling and storage

4.4.1. Labelling

4.4.2. Storage practices

References: 11,14,15,21,24,25,26

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO6	Describe the Standard Operating Procedures for bulk packing labelling and storage	1	Lecture	CC	Knows-how	L,L&PPT
CO2,CO3,CO6	Prepare the label contents and describe its significance.	4	Practical Training 4.4	CC	Shows-how	D,DL
CO2,CO3,CO6	Identify the common pests using microscopic technique, foreign matter, mix-ups etc	4	Practical Training 4.5	CAN	Shows-how	D,DIS,DL
CO2,CO3,CO6	Participate in visit to labelling section and packing section to witness the regulatory requirements	4	Experiential-Learning 4.3	CC	Does	DIS,FV

Unit 5 Equipment

4.5.1. Materials

4.5.2. Design, construction and installation

4.5.3. Identification

References: 11,14,15,21,24,25,26

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO6	Discuss the design, construction, and installation methods of the equipments	1	Lecture	CC	Knows-how	L,DIS
CO2,CO3,CO6	Participate in farm facility visit to learn about the equipment used, installation and maintenance procedures	4	Experiential-Learning 4.4	CAN	Shows-how	FV

Unit 6 Quality Assurance

4.6.1. Quality Assurance Methods

References: 11

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO6	Describe the Quality Assurance methods to be adopted for good agriculture and collection practices.	1	Lecture	CK	Knows-how	L,L_VC,L &PPT ,ML
CO2,CO3,CO6	Interact with Quality assurance team to know the Quality Assurance (QA) methods, Corrective Action & Preventive Action (CAPA) methods	2	Experiential-Learning 4.5	CC	Shows-how	DIS,D

Unit 7 Documentation

4.7.1. Records

4.7.2. Authority and access to records

References: 11

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO6	Enumerate the various records needed for the good agriculture and collection practices.	1	Lecture	CC	Knows-how	L&PPT ,L,L&GD
CO2,CO3,CO6	Analyze the Records- Name, Number, Entries, authority, and access of records required in collection, storage and packing and labelling of raw drugs	1	Experiential-Learning 4.6	CAN	Does	FV

Unit 8 Personnel

4.8.1. General

4.8.2. Health, Hygiene and Sanitation

References: 11,14,15,21,24,25,26

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO6	Describe the general health, hygiene and Sanitation measures to be adopted in GAP and GCP facility.	1	Lecture	CC	Knows-how	L&PPT ,L
CO2,CO3,CO6	Analyze the hygienic practices adopted, training protocols for the personnel hygiene	1	Experiential-Learning 4.7	CAN	Does	D,RLE,R P

Practical Training Activity

Practical Training 4.1 : Raw drugs from different sources

Total activity hrs: 3

Activity 1- Demonstration by teacher (1 hr)

The teachers should demonstrate the differences in the organoleptic characters in raw drug samples collected from different sources

Activity 2- Analysis of raw drugs (2 hrs)

The students should collect different market samples and from the farms adopting GAP compare the samples, analyse, and document the organoleptic characters of the medicinal plants.

Practical Training 4.2 : Collection of herbs adopting Good Collection Practices

Total activity hrs : 4

Activity 1- The teacher should demonstrate the good collection practices of one herb (1 hr)

Activity 2- The students should collect some herbs adopting the good collection practices (2 hrs)

Activity 3- The students should submit a research report on practices adopted in collecting different herbs (1 hr)

Practical Training 4.3 : Drying methods of raw drugs

Total activity hrs : 5

Activity 1- Assignment submission (4 hrs)

The students should submit assignments on the different drying methods adopted for medicinally used leaves after post-harvest following GAP and GCP practices.

Activity 2- Analyse the traditional and conventional methods (1 hr)

Compare the traditional methods with the advanced GCP methods and enlist the advantages and disadvantages

Practical Training 4.4 : Label contents of raw drugs

Total activity hrs: 4

Activity 1- Demonstration by teacher (1 hr)

The teacher will demonstrate the label contents of the raw drug stored in specific container

Activity 2- Preparation of label contents (3 hrs)

The students should prepare the label contents and the specifications for the raw drug given collected after harvest.

1. Describe the purpose of labelling
2. Name of the product manufacture date and expiry date
3. Batch no.
4. Instructions for use,
5. Weight and Price.

Practical Training 4.5 : Microscopic identification of pests and foreign matter

Total activity hrs: 4

Activity 1- Demonstration by teacher (1 hr)

The teacher will demonstrate the pest and foreign matter in one crude drug using microscope

Activity 2- Identification of the common pest by student (3 hrs)

The students should identify the common pest, foreign matter, and mix- ups in the given drug sample using microscopic technique in 2 drugs

1. Identify the pest
2. Identify the mix-up
3. Identify the foreign matter

Experiential learning Activity

Experiential-Learning 4.1 : Good Agriculture Practice (GAP) methods

Total activity hrs: 7

Activity 1- Field visit (5 hrs)

Visit farmland attached to pharmaceutical practising Good Agriculture Practice (GAP) and using the raw materials for product development, the traditional and modern practices in harvesting, storage and protection.

Activity 2- Report submission (2 hrs)

Submit a report on the GAP methods witnessed in the facility

Experiential-Learning 4.2 : Processing methods of crude drugs

Total activity hrs : 7

Activity 1- Farm visit (5 hrs)

Visit to farm facility to learn different processing methods, Inspection and sorting methods, Primary processing, drying and Specific processing of crude drugs.

Activity 2- Report writing (2 hrs)

Document the different methods of processing the crude drugs and their significance.

Experiential-Learning 4.3 : Labelling and packing of raw drugs

Total activity hrs : 4

Activity 1- Visit the labelling section (3 hrs)

Visit to labelling section, packing to know the regulatory requirements in label contents and their importance.

Activity 2- Report submission (1 hr)

Submit a report on the requirements in labelling and packing as per the guidelines

Experiential-Learning 4.4 : Equipments in raw drug facility

Total activity hrs: 4

Activity 1- Visit to facility to learn about the equipment used, installation and maintenance procedures in collecting, storing and packing sections (3 hrs)

Activity 2- Witness the records maintained for the same for regulatory purpose.(1 hr)

Experiential-Learning 4.5 : Quality Assurance methods for raw drugs

Total activity hrs: 2

Interaction with Quality assurance team to know the QA methods, Corrective Action and Preventive Action (CAPA) methods and their importance.(2 hrs)

Experiential-Learning 4.6 : Records and registers maintained for raw drugs

Total activity hrs: 1

Analyze the Records- Name, Number, Entries, authority and access of records and their maintenance pertaining to

1. Collection

2. Storage

3. Packing of raw materials as per regulatory requirements

Experiential-Learning 4.7 : Personnel hygiene and training

Total activity hrs: 1

Analyze the hygienic practices adopted, training protocols for the personnel and the training given and the records pertaining to them in the facility (1 hr)

Modular Assessment

Assessment method

Hour

Conduct a structured Modular assessment. Assessment will be for 50marks . Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C.

CHOOSE ANY OF THE BELOW ASSESSMENT FOR 50 MARKS

Assesment to be done by team class presentations or theory based questions on the following topics.

1. Good Agriculture Practices (GAP) - 20 marks

2. Good Collection Practices (GCP) - 10 marks

3. Storage and labelling - 10 marks

4. Personnel training and hygiene - 10 marks

or

Any practical in converted form can be taken for assessment. (25 Marks)

and

Any of the experiential as portfolios/reflections/presentations can be taken as an assessment. (25 Marks)

4

Module 5 : Cultivation methods

Module Learning Objectives

(At the end of the module, the students should be able to)

- Describe the traditional and modern cultivation methods
- Conduct and demonstrate the medium preparation for tissue culture and select the implants.
- Identify the appropriate cultivation method for medicinal plants.

Unit 1 Traditional methods of cultivation

- 5.1.1. Vegetative propagation
- 5.1.2. *In situ* conservation

References: 24,25,26,51

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO8	Elaborate about the different traditional cultivation methods of medicinal plants	4	Lecture	CC	Knows-how	L,L&GD, L&PPT
CO2,CO3,CO8	Collect and describe the seeds for rare species of medicinal plants	6	Practical Training 5.1	PSY-GUD	Shows-how	D,FV
CO2,CO3,CO8	Participate in field visit to farm lands using traditional methods of cultivation for selected medicinal plants	9	Experiential-Learning 5.1	CAP	Shows-how	FV,TBL, DIS

Unit 2 Modernized methods of cultivation of medicinal plants

- 5.2.1. *In vitro* regeneration
- 5.2.2. Vegetative propagation
- 5.2.3. Seed banks

References: 24

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO8	Describe the different modern methods of cultivation of medicinal plants for bulk harvesting	3	Lecture	CC	Knows-how	DIS,L&PPT ,L
CO2,CO3,CO8	Organize orientation and training programme on modern methods of cultivation	4	Practical Training 5.2	CAN	Shows-how	W,SY,D
CO2,CO3,CO8	Participate in visit to sites involved in cultivation of selected medicinal plants using advanced techniques for bulk harvest.	8	Experiential-Learning 5.2	CAP	Shows-how	DIS,FV

Unit 3 Tissue culture

- 5.3.1. Micropropagation
- 5.3.2. Somatic embryogenesis
- 5.3.3. Organogenesis

References: 8,50

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO8	Describe the steps involved in the tissue culture technique and its applications in the production of medicinal plants.	3	Lecture	CK	Knows-how	L&PPT ,L
CO2,CO3,CO8	Prepare culture medium and selection of explants	10	Practical Training 5.3	PSY-GUD	Shows-how	PT,DL,D

CO2,CO3,CO8	Participate in visit to Biotechnology labs to learn about tissue culture techniques	9	Experiential-Learning 5.3	AFT-REC	Does	W,D,FV
Practical Training Activity						
Practical Training 5.1 : Collection and description of seeds						
Total activity hrs : 6 Activity 1- Illustration by teacher (2 hrs) The teacher should illustrate the different traditional methods of cultivation Activity 2- Collection of seeds (4 hrs) The students should collect the seeds that are cultivated by traditional practices and describe the methods adopted for the propagation of the medicinal plant.						
Practical Training 5.2 : Modern methods of cultivation of medicinal plants						
Total activity hrs: 4 Activity 1- The teacher should demonstrate the different modern methods of cultivation of medicinal plants (1 hr) Activity 2- The students should attend at least one orientation or training program to know the modern methods of cultivation of medicinal plants (3 hrs)						
Practical Training 5.3 : Preparation of tissue culture medium						
Total activity hrs: 10 Activity 1- Demonstration by teacher (4 hrs) The teacher will demonstrate the steps in the preparation of tissue culture medium Activity 2- Preparation of tissue culture medium (6 hrs) The students should prepare the culture medium required for the tissue culture of the given explant.						
Experiential learning Activity						
Experiential-Learning 5.1 : Traditional farming methods						

Total activity hrs: 9

Activity 1- Farm visit (4 hrs)

Visit sites and farms involved in cultivation of selected medicinal plants using traditional farming methods

Activity 2- Farm visit (4 hrs)

Visit sites and farms involved in cultivation of selected medicinal plants using advanced techniques for bulk harvest

Activity 3- Team discussion (1 hr)

Compare and discuss in teams on the advantages of traditional farming methods.

Experiential-Learning 5.2 : Farm visit adopting modern cultivation methods

Total activity hrs: 8

Activity 1- Farm visit (5 hrs)

Visit sites and farms involved in cultivation of selected medicinal plants using advanced techniques for bulk harvest for different medicinal plants

Activity 2- Interaction with farmers (2 hrs)

Interact with farmers on the advantages of these methods over the traditional cultivation methods

Activity 3- Report submission (1 hr)

Submit a report comparing the traditional and modern methods of cultivation of medicinal plants

Experiential-Learning 5.3 : Tissue culture of medicinal plant

Total activity hrs: 9

Visit to Biotechnology labs to witness the steps involved in tissue culture of selected medicinal plants.

1. Collection of plant material (1 hr)

2. Surface sterilization of explant (1 hr)

3. Establishment of plant culture (2 hrs)

4. Multiplication of plants (2 hrs)

5. Rooting of regenerated plants (1 hr)

6. Acclimatization of plants. (1 hr)

7. Transfer of plants to fields. (1 hr)

Modular Assessment	
Assessment method	Hour
Conduct a structured Modular assessment. Assessment will be for 50 marks . Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. CHOOSE ANY OF THE BELOW ASSESSMENT FOR 50 MARKS Assessment can be made by class presentation or by group discussion on the following topics. 1. Traditional cultivation methods - 20 marks 2. Modern cultivation methods.- 20 marks 3. Tissue culture technique - 10 marks Or Any practical in converted form can be taken for assessment. (25 Marks) and Any of the experiential as portfolios/reflections/presentations can be taken as an assessment. (25 Marks)	4

Module 6 : Constrains in herbal drugs

Module Learning Objectives

(At the end of the module, the students should be able to)

Describe the rare, endangered, and threatened species, wild life act and their conservation methods, rationale use of mercury.
Conduct research in IUCN classification and measures adopted in conservation of the RET listed plants
Identify the alternates to rare, endangered and threatened species, relationship of Biodiversity act and Intellectual Property Rights.

Unit 1 Wildlife act

6.1.1. Implication of Wildlife act on Export, Research, Biotechnology, Cultivation, Conservation etc.,

References: 29,32

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO4 ,CO6,CO7	Describe the various RET listed plants, their conservation methods and alternates reported in the pharmacopoeias and Siddha Text and other AYUSH systems	1	Lecture	CC	Knows-how	L&PPT , BL,L,L_V C
CO2,CO3,CO4 ,CO6,CO7	Conduct research on the Rarerly Endangered and Theatened (RET) plants and recommendations on the alternatives various pharmacopoeias and Siddha classical texts.	3	Practical Training 6.1	CC	Shows-how	LS,TBL
CO2,CO3,CO4 ,CO6,CO7	Participate in visit to hill regions to identify and explore few endanger species mentioned in siddha literature and understanding Biodiversity	8	Experiential-Learning 6.1	AFT-REC	Does	FV,LS,DI S

Unit 2 Minamata convention of Mercury

6.2.1. The International agreement towards the use of Mercury and Mercurial Salts towards the Global Agreement on Environment and its current status and implications

References: 29,32

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO4,CO6,CO7	Define and describe the nine categories under IUCN classification and the methods of conservation of RET listed plants	1	Lecture	CC	Knows-how	L&PPT ,L
CO2,CO3,CO4,CO6,CO7	Conduct review on the Challenges and Limitation of Medicinal plants use for Domestic and Export and Identifying its importance and also to work on new cultivation strategies.	3	Practical Training 6.2	CAN	Shows-how	TBL,LS

Unit 3 International Union for Conservation of Nature (IUCN) Classification

- 6.3.1. Critically endangered
- 6.3.2. Endangered
- 6.3.3. Vulnerable
- 6.3.4. Near threatened
- 6.3.5. Data deficient
- 6.3.6. Not evaluated

References: 29,32

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO4,CO6,CO7	Describe the wild life act and its implication on Export, Research, Biotechnology, Cultivation, Conservation etc	1	Lecture	CC	Knows-how	L,L&PPT
CO2,CO3,CO4,CO6,CO7	Conduct research on the conservation practises pertaining to Wild life act and the way forward	1	Practical Training 6.3	CC	Shows-how	DIS,LS

Unit 4 Rare, Endangered, Threatened (RET) Listed

6.4.1. Rare, Endangered, Threatened (RET) Listed plants of India

References: 29,32

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO4 ,CO6,CO7	Elaborate the Miniata convention of Mercury agreement and Mercurial Salts towards the Global Agreement on Environment and its status and implications	1	Lecture	CC	Knows-how	L&PPT ,L
CO2,CO3,CO4 ,CO6,CO7	Conduct research on the Challenges and restriction in Mercury availability	1	Practical Training 6.4	CAP	Shows-how	LS

Unit 5 Biodiversity act

6.5.1. Intellectual Property Rights

6.5.2. Conservation

6.5.3. Sustainable use of biological resources and/ or associated knowledge, and fair and equitable sharing of benefits arising out of the use of biological resources and knowledge associated thereto including the medicinal plants

References: 29,32

3A	3B	3C	3D	3E	3F	3G
CO2,CO3,CO4 ,CO6,CO7	Define Biodiversity act and its relevance to Intellectual Property Right (IPR) and describe the methods of conservation sustainable use of biological resource	1	Lecture	CC	Knows-how	L&PPT ,L
CO2,CO3,CO4 ,CO6,CO7	Conduct Research and review on implications of Biodiversity act in Intellectual Property Rights (IPR) of Ayush medicines	2	Practical Training 6.5	CC	Knows-how	LS,PL
CO2,CO3,CO4	Participate in visit to State Biodiversity board to learn on conservation measures for	5	Experiential-	CAN	Shows-	FV,BS

,CO6,CO7	medicinal plants and wild life		Learning 6.2		how	
Practical Training Activity						
Practical Training 6.1 : Assignment on the Rarerly Endangered and Threatened (RET) plants						
Total activity hrs: 3 Activity 1- The students should prepare a detailed report on the RET plants (1 hr) Activity 2- Conservation methods of RET plants (1 hr) Activity 3- Recommendations on the alternatives being reported in various pharmacopoeia, siddha classical literatures and in other AYUSH systems (1 hr)						
Practical Training 6.2 : Medicinal plants use for Domestic and Export						
Total activity hrs: 3 Activity 1- Students should prepare assignments on the Challenges and Limitation of Medicinal plants used for Domestic and Export and Identifying its importance and also to work on new cultivation strategies. (1 hr) Activity 2- Students should prepare a research report on the Challenges and Limitation of Medicinal plants used for Domestic and Export (1 hr) Activity 3- Students should Identify its importance and also to work on new cultivation strategies.(1 hr)						
Practical Training 6.3 : Conservation practises pertaining to Wild life act						
Total activity hrs: 1 Students should prepare a research report on the conservation practises pertaining to Wild life act and the way forward (1 hr)						
Practical Training 6.4 : Challenges and restriction in Mercury availability						
Total activity hrs : 1 The teacher will elaborate the challenges the use of mercury in medicine (15 mins) Students should prepare a research report on the Challenges and restriction in Mercury availability and its use in medicine. (45 mins)						
Practical Training 6.5 : Biodiversity act in Intellectual Property Rights (IPR) of Ayush medicines						

Total activity hrs: 2 Students should prepare a research review on implications of Biodiversity act in Intellectual Property Rights (IPR) of Ayush medicines with case studies. (2 hrs)	
Experiential learning Activity	
Experiential-Learning 6.1 : Identification of Endangered plants	
Visit to hill regions to identify and explore few RET listed species mentioned in siddha literature and understanding their Biodiversity. (6 hrs) Discuss and report in teams on the RET listed plants (2 hrs) Total hrs: 8	
Experiential-Learning 6.2 : Visit to State Biodiversity board	
Total activity hrs: 5 Visit to State Biodiversity board and interact with officials on the relationship of Biodiversity act in IPR and schemes involved in the conservation measures for medicinal plants and wild life (3 hrs) Brainstrom as group activity on the challenges in patenting ayush drugs considering the Biodiversity act (2 hrs)	
Modular Assessment	
Assessment method	Hour
Conduct a structured Modular assessment. Assessment will be for 25 marks . Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. CHOOSE ANY OF THE BELOW ASSESSMENT FOR 25 MARKS Assessment to be done by structured questions on conservation methods, RET plants and rationale use of mercury- 25 marks or Any practical in converted form can be taken for assessment. (25 Marks) Or Any of the experiential as portfolios/reflections/presentations can be taken as an assessment. (25 Marks)	2

Module 7 : Thathu Vaguppu (Metals, Minerals and Salts)

Module Learning Objectives

(At the end of the module, the students should be able to)

Describe the classification based on traditional methods, purification methods and testing methods for Thathu raw materials
Prepare vaippu drug, Collection and purification of Pooneeru
Identify the new thathu drugs that is not reported in the literature.

Unit 1 Traditional classification

- 7.1.1. *Ulogam, Kaarasaaram, Paadanam, Uparasam*
- 7.1.2. *Panchabhootha Ulogangal*
- 7.1.3. Classification as per *Thasanga Vaidhya nigandu*
- 7.1.4. Classification of as per *Therayar Segarappa*
- 7.1.5. Classification as per *Bogar 7000*
- 7.1.6. Classification as per *Therayar venba*

References: 9,22,23,28,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4,CO5	Describe the types of <i>Ulogam, Kaarasaaram, Padanam, Uparasam</i> and classify the thathu raw materials as per Therayar and Bogar theories	1	Lecture	CC	Knows-how	L&PPT ,L &GD,REC
CO1,CO2,CO4,CO5	Identify and describe the thathu raw materials using traditional and geological organoleptic characters Geological characters and understanding its distribution	2	Practical Training 7.1	CE	Shows-how	DL,D

CO1,CO2,CO4,CO5	Participate in visit for collection of Pooneeru	8	Experiential-Learning 7.1	PSY-GUD	Does	FV,D
Unit 2 Classification as per Periodic table 7.2.1. Classification as per groups and periods as in periodic table References: 9,22,23,28,40,46						
3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4,CO5	Describe the classification of elements as per modern periodic table and compare the classification of thathu drugs and analyse the similarities in their properties	1	Lecture	CC	Knows-how	L&GD,L
CO1,CO2,CO4,CO5	Identify the Chemical Stucture, Identification, Bond and Chemical behaviour for the Thathu Raw materials	2	Practical Training 7.2	CC	Knows-how	PT,DL,D
Unit 3 Purification methods 7.3.1. General methods 7.3.2. <i>Theetchai seithal</i> 7.3.3. Purification by <i>Siddhar Therayar muraigal</i> References: 1,9,22,23,28,40,46						
3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4,CO5	Elaborate the general methods of purification techniques, Theetchai seithal and purification by Siddhar therayar muraigal	2	Lecture	CC	Knows-how	L,L&PPT
CO1,CO2,CO4	Conduct the Purification method, testing of pH, Qualitative, Quantitative &	5	Practical	PSY-	Shows-	PT,DA,D,

,CO5	Physicochemical properties before and after purification		Training 7.3	GUD	how	DL
CO1,CO2,CO4 ,CO5	Participate in visit to traditional vaidhyars and AYUSH Manufacturing Units to explore new and feasible purification methods	4	Experiential-Learning 7.2	CAP	Shows-how	D,FV

Unit 4 Testing methods

- 7.4.1. Macroscopic geochemical properties
- 7.4.2. Microscopic methods
- 7.4.3. X Ray Diffraction methods
- 7.4.4. Physicochemical methods
- 7.4.5. Spectroscopic methods
- 7.4.6. Assay of elements
- 7.4.7. Sophisticated analytical instruments
 - 7.4.7.1 X Ray Diffraction (XRD)
 - 7.4.7.2 X Ray Fluorescence (XRF)
 - 7.4.7.3 Scanning Electron Microscope (SEM)
 - 7.4.7.4 Transmission Electron Microscope (TEM)
 - 7.4.7.5 Atomic Absorption Spectrometry (AAS)
 - 7.4.7.6 Fourier Transform Infrared Spectroscopy (FTIR)
 - 7.4.7.7 Nuclear Magnetic Resonance (NMR)
 - 7.4.7.8 Inductively Coupled Plasma Optical Emission Spectroscopy (ICP - OES)
 - 7.4.7.9 Inductively Coupled Plasma Mass Spectroscopy (ICP - MS)

References: 9,22,23,28,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4 ,CO5	Describe the different methods and instruments used in the identification and authentication of metals and minerals and their applications	2	Lecture	CC	Knows-how	L&GD,L
CO1,CO2,CO4	Identify the raw drugs by macroscopic and microscopic characters.	4	Practical	PSY-	Shows-	DL,D

,CO5			Training 7.4	GUD	how	
CO1,CO2,CO4 ,CO5	Participate in visit to Sophisticated Analytical Instrument facility for witnessing the working of XRD, TEM, SEM, XRF, AAS, FTIR, ICP OES, ICP MS and their applications	6	Experiential-Learning 7.3	CC	Knows-how	D,DL,FV
Unit 5 Vaippu muraigal 7.5.1. Classification of vaippu muraigal 7.5.2. Types References: 4,34,46						
3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4 ,CO5	Identify and describe the various theories, types in the process of preparation drugs by vaippu and the methods to evaluate its authenticity.	3	Lecture	CC	Knows-how	L&PPT ,L&GD
CO1,CO2,CO4 ,CO5	Demonstrate the preparation of vaippu of any one thathu sarakku	7	Practical Training 7.5	PSY-GUD	Shows-how	PT,DL,D
CO1,CO2,CO4 ,CO5	Participate in visit to siddha pharmaceutical which uses vaippu raw materials for drug preparations and its importance	6	Experiential-Learning 7.4	PSY-MEC	Shows-how	D,FV,DL
Unit 6 New additions 7.6.1. Rasavathakkal 7.6.2. Karumanal 7.6.3. Kalmatham 7.6.4. Karudapatchikkal 7.6.5. Kurunthakkal 7.6.6. Chittakkal						

7.6.7. Sukkankal

References: 4,9,22,23,28,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4,CO5	Identify and describe about the identification, properties, and therapeutic indications few new thathu sarakkugal not reported in literature.	1	Lecture	CC	Knows-how	L&GD,L
CO1,CO2,CO4,CO5	Collect and identify any one new medicinally important ore and learn its purification process	2	Experiential-Learning 7.5	PSY-GUD	Shows-how	DL,D,FV,DIS

Practical Training Activity

Practical Training 7.1 : Identification of drugs by traditional and geological methods

Total activity hrs : 2

Activity 1- Demonstration by teacher (30 mins)

The teacher will demonstrate the traditional and geological features in identifying drugs

Activity 2- Students should identify, describe the given spotter using traditional and geological organoleptic characters . (1.5 hrs)

Identify the given spotter (Thathu)

1. Identify the drug

2. Describe the geological characters

Practical Training 7.2 : Identification of Raw drugs as per modern chemical properties

Total activity hrs: 2

Activity 1- The teacher will demonstrate the identification of raw drugs based on the modern classification methods (30 mins)

Activity 2- Students should identify, describe the Chemical Structure, Identification, Bond and Chemical behaviour for the given Thathu Raw materials (1.5 hrs)

Practical Training 7.3 : Demonstration of Purification method and estimate the pH changes

Total activity hrs: 5

Students should demonstrate one purification method and estimate the pH before and after purification and document the changes for the following drugs.

Annabedhi, Indhuppu, Vengaram, Padigaram, Vediuppu (5 hrs- 1 hr for each drug)

1. Demonstrate one purification method
2. Compare the pH before and after purification
3. Describe the macroscopic changes

Practical Training 7.4 : Macroscopic and microscopic identification of raw drugs

Total activity hrs: 4

The teacher will demonstrate the macroscopic and microscopic features in identification of mineral and metallic drugs (1 hr)

The student should identify the given spotter using the macroscopic and microscopic characters 10 numbers (3 hrs)

Practical Training 7.5 : Preparation of vaippu of a drug

Total activity hrs: 7

Activity 1- Preparation of vaippu (6 hrs)

The student should demonstrate the preparation of vaippu of the one thathu sarakku by traditional method

Activity 2- Compare organoleptics characters (1 hr)

Compare the organoleptics characters of the vaippu drug and drug procured from market

Experiential learning Activity**Experiential-Learning 7.1 : Collection of Pooneeru**

Total activity hrs: 8

Activity 1- Identification of site (3 hrs)

Identify the pooneeru collection site and month of collection. Arrive to the site prior to prepare for the collection of pooneeru

Activity 2- Collection of pooneeru (5 hrs)

Visit to pooneeru collection fields to collect pooneeru, appropriate time and method of collection , store the collected pooneeru in appropriate containers for further purification

Experiential-Learning 7.2 : Purification methods by Traditional Vaidhyars

Total activity hrs: 4

Visit to traditional vaidhyars and AYUSH Manufacturing Units to explore new and feasible purification methods of few thathu sarakkugal that which is not mentioned in the literature (3 hrs)

Document the procedures in the log note book (1 hr)

Experiential-Learning 7.3 : Visit to Sophisticated Analytical Instrument facility

Total activity hrs: 6

Visit to Sophisticated Analytical Instrument facility for demonstration and the working of the following sophisticated instruments (6 hrs)

1. X-Ray Diffraction (XRD),
2. Transmission Electron Microscope(TEM),
3. Scanning Electron Microscope (SEM),
4. X-Ray Fluorescence (XRF),
5. Atomic Absorption Spectroscopy (AAS),
6. Fourier Transform InfraRed Spectroscopy (FTIR),
7. Inductively Coupled Plasma Optical Emission Spectroscopy (ICP OES),
8. Inductively Coupled Plasma Mass Spectroscopy (ICP MS) and their applications in authentication and characterization of crude thathu drugs.

Experiential-Learning 7.4 : Visit to siddha pharmaceutical

Total hrs : 6

Visit to siddha pharmaceutical which uses vaippu raw materials for drug preparations and its importance in clinical implications.(4 hrs)

The crude drugs that are prepared by vaippu process, their end points and testing methods if any to be documented. (2 hrs)

Experiential-Learning 7.5 : New purification methods by Traditional vaidhyars

Total activity hrs: 2 Visits traditional vaidhyars and AYUSH Manufacturing Units to explore new and feasible purification methods of few thathu sarakkugal that which is not mentioned in the literature (2 hrs)	
Modular Assessment	
Assessment method	Hour
Conduct a structured Modular assessment. Assessment will be for 50 marks . Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. CHOOSE ANY OF THE BELOW ASSESSMENT FOR 50 MARKS Assessment can be done by theory based questions or viva or one to one discussion in the following topics 1. Traditional and modern classification of metals and minerals-10 marks 2. Purification methods - 15 marks 3. Vaippu muraikal - 10 marks 4. Instruments used to analyze mineral drugs - 15 marks or Any practical in converted form can be taken for assessment. (25 Marks) and Any of the experiential as portfolios/reflections/presentations can be taken as an assessment. (25 Marks)	4

Module 8 : Jeeva Vaguppu (Zoological products)

Module Learning Objectives

(At the end of the module, the students should be able to)

Describe the traditional and zoological classification, nutritive value of animal and animal products.
Conduct various purification processes of Animal origin drugs, estimation of pH of animal products.
Identify the varieties of animal raw drugs.

Unit 1 Traditional classification

- 8.1.1. Milk: Cow, Goat, Buffalo, Human.
- 8.1.2. Hoof: Goat, Sheep, Horse, Buffalo.
- 8.1.3. Egg: Hen, Musuru (red ant).
- 8.1.4. Horns: Goat, Sheep, Deer
- 8.1.5. Bone: Goat
- 8.1.6. Meat: Goat, Hen, Fish (Kaili), Earthworm
- 8.1.7. *Korajanam* : Cow.
- 8.1.8. Ghee: Cow, Goat, Buffalo
- 8.1.9. Feathers: Hen
- 8.1.10. Honey: Honey and its types
- 8.1.11. Urine: Goat, Cow
- 8.1.12. Dung: Cow, Goat.
- 8.1.13. Blood: Hen, Rabbit.
- 8.1.14. Excretory product: *Kasthuri*

References: 22,23,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO6	Define and describe the classification of the following products by traditional classification. Milk : Cow, Goat, Buffalo, Human. Hoof : Goat, Sheep, Horse, Buffalo. Egg : Hen, Musuru (red ant). Horns : Goat, Sheep, Deer Bone : Goat Meat : Goat, Hen, Fish(Kaili), Earthworm Korajanam : Cow. Ghee : Cow, Goat, Buffalo Feathers : Hen Honey : Honey and its types Urine : Goat, Cow Dung : Cow, Goat. Blood : Hen, Rabbit. Excretion : Kasthuri	3	Lecture	CC	Knows-how	L,L&PPT
CO1,CO2,CO6	Identify the raw materials by organoleptic characters as mentioned in classical texts	5	Practical Training 8.1	PSY-GUD	Shows-how	D,DL

Unit 2 Zoological classification

- 8.2.1. Milk: Cow, Goat, Buffalo, Human.
- 8.2.2. Hoof: Goat, Sheep, Horse, Buffalo.
- 8.2.3. Egg: Hen, Musuru (red ant).
- 8.2.4. Horns: Goat, Sheep, Deer
- 8.2.5. Bone: Goat
- 8.2.6. Meat: Goat, Hen, Fish (Kaili), Earthworm
- 8.2.7. *Korajanam* : Cow.

- 8.2.8. Ghee: Cow, Goat, Buffalo
- 8.2.9. Feathers: Hen
- 8.2.10. Honey: Honey and its types
- 8.2.11. Urine: Goat, Cow
- 8.2.12. Dung: Cow, Goat.
- 8.2.13. Blood: Hen, Rabbit.
- 8.2.14. Excretion: *Kasthuri*

References: 22,23,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO6	Define and describe the classification of the following products as per zoological classification Milk : Cow, Goat, Buffalo, Human. Hoof : Goat, Sheep, Horse, Buffalo. Egg : Hen, Musuru (red ant). Horns : Goat, Sheep, Deer Bone : Goat Meat : Goat, Hen, Fish(Kaili), Earthworm Korajanam : Cow. Ghee : Cow, Goat, Buffalo Feathers : Hen Honey : Honey and its types Urine : Goat, Cow Dung : Cow, Goat. Blood : Hen, Rabbit. Excretion : <i>Kasthuri</i>	2	Lecture	CC	Knows-how	L&GD,L &PPT
CO1,CO2,CO6	Prepare record work on the varieties and identification of Animal Raw materials	3	Practical Training 8.2	CC	Shows-how	D,DL

CO1,CO2,CO6	Participate in visit to Veterinary University, Veterinary Research Centres, Zoological survey of India	10	Experiential-Learning 8.1	CC	Does	DIS,FV,L_VC
-------------	--	----	---------------------------	----	------	-------------

Unit 3 Purification methods

- 8.3.1. Milk: Cow, Goat, Buffalo, Human.
- 8.3.2. Hoof: Goat, Sheep, Horse, Buffalo.
- 8.3.3. Egg: Hen, Musuru (red ant).
- 8.3.4. Horns: Goat, Sheep, Deer
- 8.3.5. Bone: Goat
- 8.3.6. Meat: Goat, Hen, Fish (Kaili), Earthworm
- 8.3.7. *Korajanam* : Cow.
- 8.3.8. Ghee: Cow, Goat, Buffalo
- 8.3.9. Feathers: Hen
- 8.3.10. Honey: Honey and its types
- 8.3.11. Urine: Goat, Cow
- 8.3.12. Dung: Cow, Goat.
- 8.3.13. Blood: Hen, Rabbit.
- 8.3.14. Excretion: *Kasthuri*

References: 22,23,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO6	Describe the different purification techniques for animal and its byproducts with specific examples.	3	Lecture	CC	Knows-how	L_VC,L,L &GD
CO1,CO2,CO6	Demonstrate the different purification process animal products	6	Practical Training 8.3	CE	Shows-how	D,DL
CO1,CO2,CO6	Participate in visit to Ayush pharmaceuticals to learn the methods and processing of animal products	8	Experiential-Learning 8.2	CC	Does	FV,DIS

Unit 4 Nutritive and therapeutic values of animal products

8.4.1. Milk and milk products

8.4.2. Poultry

8.4.3. Medicinally used meat

References: 22,23,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO6	Elaborate the nutritive and therapeutic values of the following animal product Milk and milk products Poultry Medicinally used meat	2	Lecture	CC	Knows-how	L,L&PPT
CO1,CO2,CO6	Estimate the pH, qualitative parameters, of some animal products	6	Practical Training 8.4	PSY-GUD	Shows-how	PT,D,DL
CO1,CO2,CO6	Participate in visit to Pharmaceuticals, dairy farm for milk and milk products and poultry	8	Experiential-Learning 8.3	CC	Knows-how	DL,FV

Practical Training Activity

Practical Training 8.1 : Identification of raw drugs by organoleptic characters

Total activity hrs: 5

The teacher will demonstrate the key identification features of few raw drugs of animal origin (1 hr)

The students should identify the given jeeva porul (animal product) using organoleptic characters and describe them.(4 hrs)

Minimum 10 drugs should be kept for identification

Practical Training 8.2 : Raw drug varieties and identification

Total activity hrs: 3

The teacher will demonstrate the different varieties of raw drugs and features to distinguish them (1 hr)

The students should describe different varieties available of the given spotter and describe their medicinal values.(2 hrs)

Minimum 5 spotters should be kept

Practical Training 8.3 : Purification of animal based raw drug

Total activity hrs: 6

Activity 1- Demonstration by teacher (1 hr)

The teacher will demonstrate the purification of one raw drug and record the organoleptic characters before and after purification

Activity 1- Demonstration by student (5 hrs)

The students should demonstrate and describe at least one purification method for the given animal product - 4 number of drugs

Practical Training 8.4 : Estimation of pH of dairy products

Total hrs : 6

The teacher will demonstrate the pH of one animal product (1 hr)

The students should estimate the pH of the given dairy product and identify one qualitative parameter that is helpful in the identification for the same. (4 hrs)

Estimate the pH.

Demonstrate one qualitative test to identify the drug (1 hr)

Experiential learning Activity

Experiential-Learning 8.1 : Varieties and distribution of zoological medicinal products

Total activity hrs: 10 hrs

Activity 1- Visit to Veterinary University/Veterinary Research Centres/ Zoological survey of India to know the varieties, current status, distribution of the zoological medicinal products. (6 hrs)

Activity 2- Compare the animal products with identification features as mentioned in classical texts and that as per modern classification (4 hrs)

Experiential-Learning 8.2 : Processing of Animal products	
Total activity hrs: 8 Visit to pharma to learn the methods and processing of animal products and identifying the changes in their organoleptic characters before and after purification.(6 hrs) Discuss and submit a report on the organoleptic changes in the drugs before and after purification (2 hrs)	
Experiential-Learning 8.3 : Visit to dairy and poultry farms	
Total hrs: 8 Activity 1- Visit to Pharmaceuticals, dairy farm for milk and milk products and poultry to know the species identification, authentication methods and nutritional and medicinal importance of dairy and poultry products. (5 hrs) Activity 2- Witness the processing methods of milk and milk products, poultry products. (3 hrs)	
Modular Assessment	
Assessment method	Hour
Conduct a structured Modular assessment. Assessment will be for 50 marks . Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. CHOOSE ANY OF THE BELOW ASSESSMENT FOR 50 MARKS Assessment can be done by structured LAQ in the following topics 1. Traditional classification - 10 marks 2. Zoological classification - 10 marks 3. Purification methods - 20 marks 4. Nutritive value - 10 marks or Any practical in converted form can be taken for assessment. (25 Marks) and Any of the experiential as portfolios/reflections/presentations can be taken as an assessment. (25 Marks)	4

Module 9 : Kadal porutkal (Marine Products)

Module Learning Objectives

(At the end of the module, the students should be able to)

Describe the traditional classification, Zoological classification and purification methods of some Siddha Marine products
Conduct microscopic identification of Pavalam and muthu
Identify the marine drugs using macroscopic and microscopic features.

Unit 1 Traditional classification

9.1.1. Shells, Crab, fresh water muscle, Snail, Pearl oyster, Conch shell (*Sangu*) Common oyster

References: 22,23,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4	Describe the classification of the following products by traditional classification. Shells, Crab, fresh water muscle, Snail, Pearl oyster, Conch shell (<i>Sangu</i>) Common oyster	1	Lecture	CC	Knows-how	L&GD,L
CO1,CO2,CO4	Identify the shells using macroscopic features as mentioned in the classical texts.	2	Practical Training 9.1	CC	Shows-how	D,PT

Unit 2 Zoological classification

9.2.1. Shells, Crab, fresh water muscle, Snail, Pearl oyster, Conch shell (*Sangu*) Common oyster

References: 22,23,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4	Describe the classification of the following products as per zoological classification.	1	Lecture	CC	Knows-how	L,L&GD
CO1,CO2,CO4	Conduct research work on the varieties and identification of Marine Raw materials	2	Practical Training 9.2	CAN	Shows-how	LS,DL,D
CO1,CO2,CO4	Participate in visit to Sea Shell Museum	4	Experiential-Learning 9.1	CC	Knows-how	FV

Unit 3 Availability and collection of Pavalam (Coral reefs)and varieties

9.3.1. Availability of *Pavalam*

9.3.2. Macroscopic and Microscopic features of *Pavalam*

References: 22,23,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4	Describe the distribution, varieties, identification features and collection methods of Pavalam	2	Lecture	CC	Knows-how	L&GD,L &PPT
CO1,CO2,CO4	Identify by organoleptic and microscopic characters of <i>pavalam</i>	3	Practical Training 9.3	CE	Shows-how	D,DL
CO1,CO2,CO4	Participate in visit to Marine Research Canter to learn the varieties, distribution and adulteration in <i>Pavalam</i> (Coral reefs)	4	Experiential-Learning 9.2	CC	Does	FV

Unit 4 Availability and collection of Muthu (Pearl)and varieties

9.4.1. Availability of *Muthu*

9.4.2. Macroscopic and Microscopic features of *Muthu*

References: 22,23,40,46

3A	3B	3C	3D	3E	3F	3G
CO1,CO2,CO4	Identify the drug <i>Muthu</i> by organoleptic and microscopic characters	3	Practical Training 9.4	CE	Shows-how	D,DL,PT
CO1,CO2,CO4	Describe the distribution, varieties, identification features and collection methods of <i>Muthu</i>	1	Lecture	CC	Knows-how	L&PPT, L, L_VC
CO1,CO2,CO4	Participate in visit to Ecology and Marine Biology Centres to learn the varieties, distribution and adulteration in Muthu (Pearl)	5	Experiential-Learning 9.3	CC	Knows-how	FV

Practical Training Activity

Practical Training 9.1 : Identification the shells by macroscopic characters

Total activity hrs: 2

The students should identify the given shell using the macroscopic features as mentioned in the classical text. (2 hrs)

Identify the drug

Classify the drug as per zoological classification.

Practical Training 9.2 : Varieties in raw materials of marine origin

Total activity hrs: 2

The teacher will demonstrate different varieties in one marine raw drug (30 mins)

The students should submit a report on different varieties as per the zoological classification.- 3 numbers (1.5 hrs)

Practical Training 9.3 : Identification of *pavalam* by organoleptic and microscopic characters

Total activity hrs: 3

Activity 1- Demonstration by teacher (1 hr)

The teacher will demonstrate the macroscopic and microscopic features of *Pavalam* helpful in identifying authentic drug

Activity 2- Identification by student (2 hrs)

The students should identify whether the given sample of *pavalam* is authentic using the microscopic characters

Identify the authentic *Pavalam* using microscope and note the salient microscopic features

Practical Training 9.4 : Identification of *Muthu* (Pearl) by microscopic method

Total activity hrs: 3

The teacher will demonstrate the microscopic features for the identification of muthu (1 hr)

The students should identify whether the given sample of Muthu is authentic using the microscopic characters (2 hrs)

Identify the authentic Muthu using microscope

Note the salient microscopic features

Experiential learning Activity

Experiential-Learning 9.1 : Identification of shells in Sea Shell Museum

Total activity hrs: 4

Visit to Sea Shell Museum to understand the morphological classification, identification features of different varieties of medicinally used shells.(3 hrs)

Document and prepare a report on the salient features of identification of shell products (1 hr)

Experiential-Learning 9.2 : Varieties and distribution of *Pavalam* (Coral reefs)

Total activity hrs: 4

Visit to Marine Research Center to learn the varieties, distribution and adulteration in Pavalam (Coral reefs) (3 hrs)

Record the varieties and adulterants of Pavalam (1 hr)

Experiential-Learning 9.3 : Distribution and varieties in muthu (Pearl)

Total activity hrs: 5 Visit to Ecology and Marine Biology Centres to learn the varieties, distribution and adulteration in Muthu (Pearl) (4 hrs) Submit a report on the availability, authenticity and varieties of Pearl (1 hr)	
Modular Assessment	
Assessment method	Hour
Conduct a structured Modular assessment. Assessment will be for 25 marks . Keep a structured marking pattern. Use different assessment methods in each module for the semester. Keep a record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. CHOOSE ANY OF THE BELOW ASSESSMENT FOR 25 MARKS Assessment to be done by structured questions on traditional classification, identification of muthu and pavalam or Any practical in converted form can be taken for assessment. (25 Marks) Or Any of the experiential as portfolios/reflections/presentations can be taken as an assessment. (25 Marks)	2

Table 4 : Practical Training Activity

(*Refer table 3 of similar activity number)		
Practical No*	Practical name	Hours
1.1	Identify the dosage form	10
1.2	Identification of raw drugs	10
2.1	Quality control parameters in Ayush pharmacopoeias	5
2.2	Quality aspects in International pharmacopoeia	5
2.3	Quality standards of raw drugs in guidelines	10
3.1	Total microbial count of chooranam	3
3.2	Identification of drugs by macroscopic method	4
3.3	Preparation of pachai ennai and ootrina ennai	4
3.4	Demonstration of purification methods	4
3.5	Phytochemical changes in purification methods	2
3.6	Collection of Misleading Advertisements	3
4.1	Raw drugs from different sources	3
4.2	Collection of herbs adopting Good Collection Practices	4
4.3	Drying methods of raw drugs	5

4.4	Label contents of raw drugs	4
4.5	Microscopic identification of pests and foreign matter	4
5.1	Collection and description of seeds	6
5.2	Modern methods of cultivation of medicinal plants	4
5.3	Preparation of tissue culture medium	10
6.1	Assignment on the Rarerly Endangered and Threatened (RET) plants	3
6.2	Medicinal plants use for Domestic and Export	3
6.3	Conservation practises pertaining to Wild life act	1
6.4	Challenges and restriction in Mercury availability	1
6.5	Biodiversity act in Intellectual Property Rights (IPR) of Ayush medicines	2
7.1	Identification of drugs by traditional and geological methods	2
7.2	Identification of Raw drugs as per modern chemical properties	2
7.3	Demonstration of Purification method and estimate the pH changes	5
7.4	Macroscopic and microscopic identification of raw drugs	4
7.5	Preparation of vaippu of a drug	7
8.1	Identification of raw drugs by organoleptic characters	5
8.2	Raw drug varieties and identification	3
8.3	Purification of animal based raw drug	6
8.4	Estimation of pH of dairy products	6
9.1	Identification the shells by macroscopic characters	2

9.2	Varieties in raw materials of marine origin	2
9.3	Identification of pavalam by organoleptic and microscopic characters	3
9.4	Identification of Muthu (Pearl) by mocroscopic method	3

Table 5 : Experiential learning Activity

(*Refer table 3 of similar activity number)		
Experiential learning No*	Experiential name	Hours
1.1	Literature collection on evolution of Siddha drugs	6
1.2	Literature collection on nomenclature of drugs	6
1.3	Standard Operating Procedures	7
1.4	Collection of raw drugs	7
2.1	Development of pharmacopoeia	10
2.2	Quality standards of raw drugs	10
2.3	Instruments to maintain Quality standards of raw drugs	6
3.1	Distribution of medicinal plants	2
3.2	Conservation of medicinal plants	5
3.3	Drug identification by microscopic methods and instruments	7
3.4	Plant collection methods	3
3.5	Purification methods by traditional vaidhyars	4
3.6	Misleading Advertisements	3
3.7	Cultivation and propagation methods.	2
4.1	Good Agriculture Practice (GAP) methods	7
4.2	Processing methods of crude drugs	7
4.3	Labelling and packing of raw drugs	4

4.4	Equipments in raw drug facility	4
4.5	Quality Assurance methods for raw drugs	2
4.6	Records and registers maintained for raw drugs	1
4.7	Personnel hygiene and training	1
5.1	Traditional farming methods	9
5.2	Farm visit adopting modern cultivation methods	8
5.3	Tissue culture of medicinal plant	9
6.1	Identification of Endangered plants	8
6.2	Visit to State Biodiversity board	5
7.1	Collection of Pooneeru	8
7.2	Purification methods by Traditional Vaidhyars	4
7.3	Visit to Sophisticated Analytical Instrument facility	6
7.4	Visit to siddha pharmaceutical	6
7.5	New purification methods by Traditional vaidhyars	2
8.1	Varieties and distribution of zoological medicinal products	10
8.2	Processing of Animal products	8
8.3	Visit to dairy and poultry farms	8
9.1	Identification of shells in Sea Shell Museum	4
9.2	Varieties and distribution of Pavalam (Coral reefs)	4

Table 6 : Assessment Summary: Assessment is subdivided in A to H points**6 A : Number of Papers and Marks Distribution**

Subject Code	Paper	Theory	Practical	Total
SIDPG-AB-GM	1	100	200	300

6 B : Scheme of Assessment (Formative and Summative Assessment)**Credit frame work**

SIDPG-AB-GM consists of 9 modules totaling 16 credits, which correspond to 480 Notional Learning Hours. Each credit comprises 30 Hours of learner engagement, distributed across teaching, practical, and experiential learning in the ratio of 1:2:3. Accordingly, one credit includes 5 hours of teaching, 10 hours of practical training, 13 hours of experiential learning, and 2 hours allocated for modular assessment, which carries 25 marks.

Formative Assessment :Module wise Assessment:will be done at the end of each module. Evaluation includes learners active participation to get Credits and Marks. Each Module may contain one or more credits.

Summative Assessment:Summative Assessment (University examination) will be carried out at the end of Semester II.

6 C : Calculation Method for Modular Grade Points (MGP)

Module Number & Name (a)	Credits (b)	Actual No. of Notional Learning Hours (c)	Attended Number of notional Learning hours (d)	Maximum Marks of assessment of modules (e)	Obtained Marks per module (f)	MGP =d* f/c*e*100
M1. Marunthugalin peyaridal matrum vagaippadu(Basics, Nomenclature, and classification of drugs)	2	60		50		
M2. Marunthagaviyal (Pharmacopoeias)	2	60		50		
M3. Mooligai vaguppu (Herbal drugs)	2	60		50		
M4. Good Agriculture, Collection and Storage practices	2	60		50		
M5. Cultivation methods	2	60		50		
M6. Constrains in herbal drugs	1	30		25		
M7. Thathu Vaguppu (Metals, Minerals and Salts)	2	60		50		
M8. Jeeva Vaguppu (Zoological products)	2	60		50		
M9. Kadal porutkal (Marine Products)	1	30		25		

$$\text{MGP} = \frac{(\text{Number of Notional learning hours attended in a module}) \times (\text{Marks obtained in the modular assessment})}{(\text{Total number of Notional learning hours in the module}) \times (\text{Maximum marks of the module})} \times 100$$

6 D : Semester Evaluation Methods for Semester Grade Point Average (SGPA)

SGPA will be calculated at the end of the semester as an average of all Module MGPs. Average of MGPs of the Semester For becoming eligible for Summative assessment of the semester, student should get minimum of 60% of SGPA

SGPA = Average of MGP of all modules of all papers = add all MGPs in the semester/ no. of modules in the semester
Evaluation Methods for Modular Assessment

A S.No	B Module number and Name	C MGP
1	M1.Marunthugalin peyaridal matrum vagaippadu(Basics, Nomenclature, and classification of drugs)	C1
2	M2.Marunthagaviyal (Pharmacopoeias)	C2
3	M3.Mooligai vaguppu (Herbal drugs)	C3
4	M4.Good Agriculture, Collection and Storage practices	C4
5	M5.Cultivation methods	C5
6	M6.Constrains in herbal drugs	C6
7	M7.Thathu Vaguppu (Metals, Minerals and Salts)	C7
8	M8.Jeeva Vaguppu (Zoological products)	C8
9	M9.Kadal porutkal (Marine Products)	C9
	Semester Grade point Average (SGPA)	(C1+C2+C3+C4+C5+C6+C7+C8+C9) / Number of modules(9)

S. No	Evaluation Methods
1.	Method explained in the Assessment of the module or similar to the objectives of the module.

6 E : Question Paper Pattern

MD/MS SIDDHA Examination SIDPG-AB-GM Sem II

Time: 3 Hours ,**Maximum Marks:** 100
INSTRUCTIONS: All questions compulsory

		Number of Questions	Marks per Question	Total Marks
Q 1	Application-based Questions (ABQ)	1	20	20
Q 2	Short answer questions (SAQ)	8	5	40
Q 3	Analytical based structured Long answer question (LAQ)	4	10	40

				100
--	--	--	--	-----

6 F : Distribution for summative assessment (University examination)

S.No	List of Module/Unit	ABQ	SAQ	LAQ
(M-1)Marunthugalin peyaridal matrum vagaippadu(Basics, Nomenclature, and classification of drugs) (Marks: Range 5-15)				
1	(U-1) History of Gunapadam (Siddha Materia Medica)	No	Yes	Yes
2	(U-2) .Nomenclature	No	Yes	Yes
3	(U-3) Types of Internal and External medicines with their shelf life	No	Yes	Yes
4	(U-4) Classification of Drugs	No	Yes	Yes
(M-2)Marunthagaviyal (Pharmacopoeias) (Marks: Range 5-20)				
1	(U-1) Indian Pharmacopoeias	No	Yes	No
2	(U-2) International Pharmacopoeias	No	Yes	No
3	(U-3) Quality standards	Yes	Yes	Yes
(M-3)Mooligai vaguppu (Herbal drugs) (Marks: Range 5-20)				
1	(U-1) Distribution and availability	No	Yes	No
2	(U-2) Challenges and limitations	No	Yes	Yes
3	(U-3) Authentication, Substitutes, Alternatives	No	Yes	Yes
4	(U-4) Specific collection and processing methods	No	Yes	Yes
5	(U-5) Purification and scientific rationale	Yes	Yes	No
6	(U-6) Schedule E1 and Schedule J (Drugs and Cosmetics act, 1940)	No	Yes	No
7	(U-7) Magic remedies act (Drugs and Cosmetics act, 1940)	No	Yes	Yes
8	(U-8) Thogai sarakkugal	No	Yes	No
9	(U-9) Introduction to plants of commercially important	No	Yes	Yes
(M-4)Good Agriculture, Collection and Storage practices (Marks: Range 5-15)				
1	(U-1) Good Agriculture Practices(GAP)	No	Yes	Yes
2	(U-2) Good Collection Practices (GCP)	No	Yes	Yes
3	(U-3) Post harvest processing	No	Yes	No
4	(U-4) Bulk packing, labelling and storage	No	Yes	No
5	(U-5) Equipment	No	Yes	No
6	(U-6) Quality Assurance	No	Yes	No
7	(U-7) Documentation	No	Yes	No
8	(U-8) Personnel	No	Yes	No

(M-5)Cultivation methods (Marks: Range 5-20)				
1	(U-1) Traditional methods of cultivation	No	Yes	Yes
2	(U-2) Modernized methods of cultivation of medicinal plants	No	Yes	Yes
3	(U-3) Tissue culture	Yes	Yes	Yes
(M-6)Constrains in herbal drugs (Marks: Range 5-15)				
1	(U-1) Wildlife act	No	Yes	Yes
2	(U-2) Minamata convention of Mercury	No	Yes	Yes
3	(U-3) International Union for Conservation of Nature (IUCN) Classification	No	Yes	Yes
4	(U-4) Rare, Endangered, Threatened (RET)Listed	No	Yes	Yes
5	(U-5) Biodiversity act	No	Yes	Yes
(M-7)Thathu Vaguppu (Metals, Minerals and Salts) (Marks: Range 5-20)				
1	(U-1) Traditional classification	No	Yes	No
2	(U-2) Classification as per Periodic table	No	Yes	No
3	(U-3) Purification methods	Yes	No	Yes
4	(U-4) Testing methods	Yes	Yes	No
5	(U-5) Vaippu muraigal	No	No	Yes
6	(U-6) New additions	No	Yes	No
(M-8)Jeeva Vaguppu (Zoological products) (Marks: Range 5-15)				
1	(U-1) Traditional classification	No	Yes	No
2	(U-2) Zoological classification	No	Yes	No
3	(U-3) Purification methods	No	Yes	Yes
4	(U-4) Nutritive and therapeutic values of animal products	No	Yes	Yes
(M-9)Kadal porutkal (Marine Products) (Marks: Range 5-15)				
1	(U-1) Traditional classification	Yes	Yes	No
2	(U-2) Zoological classification	No	Yes	No
3	(U-3) Availability and collection of Pavalam (Coral reefs)and varieties	No	Yes	Yes
4	(U-4) Availability and collection of Muthu (Pearl)and varieties	No	Yes	Yes

6 G : Instruction for the paper setting & Blue Print for Summative assessment (University Examination)

Instructions for the paper setting.

- 100 marks question paper shall contain:-
 - Application Based Question: 1 No (carries 20 marks)
 - Short Answer Questions: 8 Nos (each question carries 05 marks)
 - Long Answer Questions: 4 Nos (each question carries 10 marks)
- Questions should be drawn based on the table 6F.
- Marks assigned for the module in 6F should be considered as the maximum marks. No question shall be asked beyond the maximum marks.
- Refer table 6F before setting the questions. Questions should not be framed on the particular unit if indicated “NO”.
- There will be a single application-based question (ABQ) worth 20 marks. No other questions should be asked from the same module where the ABQ is framed.
- Except the module on which ABQ is framed, at least one Short Answer Question should be framed from each module.
- Long Answer Question should be analytical based structured questions assessing the higher cognitive ability.
- Use the Blueprint provided in 6G or similar Blueprint created based on instructions 1 to 7

Blueprint		
Question No	Type of Question	Question Paper Format
Q1	Application based Questions 1 Question 20 marks All compulsory	M2.U3 Or M3.U5 Or M5.U3 Or M7.U3 Or M7.U4 Or M9.U1
Q2	Short answer Questions Eight Questions 5 Marks Each All compulsory	1. M5.U1 Or . M5.U2 Or . M6.U1 Or . M6.U2 Or . M6.U3 Or . M6.U4 Or . M6.U5 2. M8.U1 Or . M8.U2 Or . M8.U3 Or . M8.U4 Or . M9.U1 Or . M9.U2 Or . M9.U3 Or . M9.U4 3. M7.U1 Or . M7.U2 Or . M7.U6 4. M4.U1 Or . M4.U2 Or . M4.U3 Or . M4.U4 Or . M4.U5 Or . M4.U6 Or . M4.U8 5. M2.U1 Or . M2.U2 Or . M2.U3 6. M1.U1 Or . M1.U2 Or . M1.U3 Or . M1.U4 7. M3.U4 Or . M3.U6 Or . M3.U7 8. M3.U9
Q3	Analytical Based Structured Long answer Questions Four Questions 10 marks each All compulsory	1. M7.U3 Or . M7.U5 Or . M8.U3 Or . M8.U4 Or . M1.U1 2. M6.U1 Or . M6.U2 Or . M6.U3 Or . M6.U4 Or . M6.U5 Or . M4.U1 Or . M4.U2 3. M3.U3 Or . M3.U4 Or . M3.U7 Or . M3.U9 4. M1.U2 Or . M1.U3 Or . M1.U4

6 H : Distribution of Practical Exam (University Examination)

S.No	Heads	Marks
1	1. Prepare Pachai ennai and ootrina ennai or 2. Demonstrate 2 different purification methods and note the organoleptic and pH changes before and after purification or 3. Demonstrate the vaippu of the given sample / Prepare the culture medium for the given explant/ Estimate the pH for the given samples	80
2	1. Identify the given dosage form, describe the shelf life and tools required to prepare the same (or) 2. Identify the given spotter with their macroscopic characters and identify the adulterant (or) 3. Identify the foreign matter (or) 4. Identify the given spotter using the geological characters (or) 5. Identify the given spotter with the zoological classification (or) 6. Identify the given shell (or) 7. Identify the given spotter using microscopic characters (or)	60
3	Viva (2 examiners: 20 marks/each examiner)	40
4	Logbook (Activity record)	10
5	Practical/Clinical record	10
Total Marks		200

Reference Books/ Resources

S.No	References
1	Anaivaari Anandhan. Sarakku Suththi Seimuraigal. Directorate of Indian Medicine and Homeopathy.
2	Anandakumar A. Theraiyar Kapiyam.
3	Ayiothithaaasar Kaviraja Pandithar, Bohar Vaithiyam -700, Edn. 2008
4	Chandrasekharan T. Konganavar Vaippu Nooru. Government Oriental Manuscripts Library, Published under the authority of the Governmery of Madras, Published by Sree. S. Gopalan B.A.B.L,Edn -1951.
5	Chaudhuri AB, DD Sarkar. Biodiversity Endangered (India's Threatened Wildlife and Medicinal Plants). Edn. 2002.
6	Duraisamy T. Therayarkarisal 300. Edn.1926. Buvaneshvari Press, Chennai.
7	Evaluation of Ayurvedic Formulations General guidelines for Safety Toxicity. Central Council for Research in Ayurvedic Sciences.
8	Farooqi AA, Sreeramu BS. Cultivation of Medicinal and Aromatic Crops
9	General Guidelines for Safety for Drug development of Ayurvedic formulations. Central Council for Research in Ayurvedic Sciences.
10	Glossary of Siddha Terminology. BIS- Bureau of Indian Standards
11	Good Agriculture Practice. TNAU Portal.
12	Gupta VK. Traditional and Folk Herbal Medicine Recent Research. Vol. 2. CSIR- Indian Institute of Integrative Medicine.
13	Hakkim P Mohamed Abdulla Saibu. Therayar Yamaga Venba Moolamum & Uuraiyum.
14	https://siddhacouncil.com/ccrs/home/
15	https://www.tmpgc.com/
16	Indian Herbal Pharmacopoeia Volume II. A Joint Publication of Regional Research Laboratory (Council of Scientific & Industrial Research) JAMMU TAWI and Indian Drug Manufacturers' Association.
17	Iyangannu R. Mooligai Ariviyal. Jawaharlal Nehru Tropical Botanic Garden & Research Institute Palode, Thiruvananthapuram – 695 562.
18	Kannusamiyampillai S, Vaithiyasinthaamani. Sikitcharatnatheepam, Part -2,Edn. 2007.
19	Kannusamypillai C. Sikitcha RatnaTheepam.
20	Marunthu Sei Iyalum Kalaiyum. Directorate of Indian Medicine and Homeopathy, Chennai.
21	Murugesu Muthaliyar KS. Gunapadamooligaivaguppu. 9th edition, Indian medicine – Homeopathy departent, Chennai.
22	Nadkarni AK. Materia Medica & Therapeutic 254. History of Siddha Medicine. Third Revised Edition 1982, Reprint-2005 by Taj Press, Delhi.
23	Nadkarni AK. Third Revised Edition 1982, Reprint-2005 by Taj Press, Delhi.

24	Panda H. Commercial cultivation of Medicinal and Aromatic Plants
25	Panda H. Medicinal Plants: Cultivation and their Uses
26	Pandu H. Herbs Cultivation and Medicinal Uses. National institute of Industrial Research.
27	Pandurangan AG, KBVrinda. Mathew Dan Frontiers in Plant Taxonomy.
28	Protocol for Testing. Pharmacopial Laboratory for Indian Medicine. Ghaziabad, Department of AYUSH, Ministry of health and welfare, Govt. of India 2011.
29	Pullalah T. Biodiversity in India. Vol. 1. Department of Botany Sri Krishnadevaraya Anantapur, Edn. 2002.
30	Rastogi RP, Mehrotra BN. Compendium of Indian Medicinal Plants. Edn. 1998. Central Drug Research Institute and Publications, New Delhi.
31	Ravindra Sharma, Bhatt BN. Medicinal and Aromatic Plants in India.
32	Review on Indian Medicinal Plants. Vol. 1 –X, ICMR, New Delhi
33	Robert Verpoorte, Pulok K Mukherjee. GMP Botanical Regulatory and Quality Issues on Phytomedicines.
34	Samba Sivampillai TV. Tamil English Dictionary. The research institute of Siddhar's science, Mount Road, Chennai.
35	Siddha Marunthu Muraiyiyal - "Siddha pharmacopoeia". All Island Service Siddha Ayurvedic Medical Officers Union, Jafna, Sri Lanka, 1st Edn. 2000.
36	Siddha Marunthu Muraiyiyal- Siddha Pharmacopial. Ahilallangai Arasu Sevai Siddha Ayurvedha Vaithiya Athigaarigal Sangam.
37	Siddha Medico Ethno Botanical Folklorer. Survey of Medicinal Plant Unit- CCRS, Ministry of AYUSH.
38	Somasundaram S. Taxonomy of Angiosperms and Economic Plants Medicinal Plants Used in Siddha & Ayurveda Plants and Siddha System of Medicine, Edn. 2013.
39	Somasundharam S. Medicinal Botany, Volume -1 Published by Ilangovan, Edn. 1997.
40	Sornamariyammal I. Siddha Marunthaakiyal Vidhigalum Seimuraigalum. Indian Medicine-Homeopathy Department, Chennai-600106.
41	The Siddha Formulary of India (Part I). 1st Edn, 2011, Dept of AYUSH, Ministry of Health and Welfare, Government of India.
42	The Siddha Pharmacopoeia of India. Part-I, Vol. I, 1st Edn. Department of Ayush, Ministry of Health and family Welfare,. Government of India, New Delhi.
43	The Siddha Pharmacopolia of India Part I. Volume II. Department of AYUSH. Ministry of Health & Family welfare, Government of India.
44	Therayar Yamaga Venba Vol.1,2,3.The Indian Medicine & Homeopathy Department.
45	Thiru Sivan. Yagopu Chunnakaandam 600. Second Edition – 2015.

46	Thiyagarajan R. Gunapadam - Thadhu Jeevam.Eighth edition, Indian medicine- Homeopathy department, Chennai - 600106.
47	Uthamarayan KS. Siddha Maruthuvanga Surukkam. 4th Edn, 2008. Directorate of Indian Medicine and Homeopathy.
48	Uthamarayan KS. Thotrakirama Aaratchiyum Siddha Maruthuva Varalarum. 4th Edn, 2008. Directorate of Indian Medicine and Homeopathy.
49	VaithiyaVithuvan S. Aathma Ratchamirtham EnnumVaithya Sara Sankeeragam. Kannusamy Pillai Ratna Nayagan Sons, 1908.
50	Wallis TE. Textbook of pharmacognosy Pharmaceutical Society of Great Britain; Sometime leader in Pharmacognosy, University of London; Hanbury Gold Medallist, Edn -1939.
51	Wealth of India. National Institute of Science Communication and Information Resources. CSIR, 1985.
52	WHO International Standard Terminologies on Siddha Medicine. WHO guidelines.

Abbreviations

Domain		T L Method		Level	
CK	Cognitive/Knowledge	L	Lecture	K	Know
CC	Cognitive/Comprehension	L&PPT	Lecture with PowerPoint presentation	KH	Knows how
CAP	Cognitive/Application	L&GD	Lecture & Group Discussion	SH	Shows how
CAN	Cognitive/Analysis	L_VC	Lecture with Video clips	D	Does
CS	Cognitive/Synthesis	REC	Recitation		
CE	Cognitive/Evaluation	SY	Symposium		
PSY-SET	Psychomotor/Set	TUT	Tutorial		
PSY-GUD	Psychomotor/Guided response	DIS	Discussions		
PSY-MEC	Psychomotor/Mechanism	BS	Brainstorming		
PSY-ADT	Psychomotor Adaptation	IBL	Inquiry-Based Learning		
PSY-ORG	Psychomotor/Origination	PBL	Problem-Based Learning		
AFT-REC	Affective/ Receiving	CBL	Case-Based Learning		
AFT-RES	Affective/Responding	PrBL	Project-Based Learning		
AFT-VAL	Affective/Valuing	TBL	Team-Based Learning		
AFT-SET	Affective/Organization	TPW	Team Project Work		
AFT-CHR	Affective/ characterization	FC	Flipped Classroom		
		BL	Blended Learning		
		EDU	Edutainment		
		ML	Mobile Learning		
		ECE	Early Clinical Exposure		
		SIM	Simulation		
		RP	Role Plays		
		SDL	Self-directed learning		
		PSM	Problem-Solving Method		
		KL	Kinaesthetic Learning		
		W	Workshops		
		GBL	Game-Based Learning		
		LS	Library Session		
		PL	Peer Learning		
		RLE	Real-Life Experience		
		PER	Presentations		
		D-M	Demonstration on Model		
		PT	Practical		
		X-Ray	X-ray Identification		
		CD	Case Diagnosis		
		LRI	Lab Report Interpretation		

		DA	Drug Analysis		
		D	Demonstration		
		D-BED	Demonstration Bedside		
		DL	Demonstration Lab		
		DG	Demonstration Garden		
		FV	Field Visit		
		JC	Journal Club		
		Mnt	Mentoring		
		PAL	Peer Assisted Learning		
		C_L	Co Learning		
		DSN	Dissection		
		PSN	Prosection		