CENTRAL COUNCIL OF INDIAN MEDICINE

SIDDHA MARUTHUVA PERARINGNAR (M.D. (SIDDHA) COURSE

SYLLABUS FOR GUNAPADAM (MATERIA MEDICA AND PHARMACOLOGY) SPECIALITY

[UNDER THE INDIAN MEDICINE CENTRAL COUNCIL (POST GRADUATE SIDDHA EDUCATION) REGULATIONS, 2016.]

GOALS:

- Developing and Standardizing the Siddha Pharmacology on the basis of siddha fundamental principles and science in the line of modern scientific approach in treating various ailments affecting mankind.

- Composing the extensive Siddha pharmacology and therapeutics in international standards and fit into place in the global healthcare delivery.

OBJECTIVES:

- To create potent resources for the development of Siddha pharmacology in teaching, and research areas.
- Developing professional therapeutic expertise in siddha for effective clinical management in treating various challenging diseases.
- Scientific study of various siddha formulations and their therapeutic applications for global acceptance.
- To standardize drug dosage regimen for various siddha formulations indicated for various ailments.
- Detailed study pharmco-vigilance mechanism of Siddha system of medicine.
- To study the interrelation of siddha drug pharmacology with molecular biology and chemistry.
- To establish and develop the pharmacopeia of various siddha medications.
- To establish the standardization of raw materials and their purification methods.
- To ensure the safety and efficacy of siddha formulations by doing proper scientific research evaluation studies.
- To equip the students by imparting industrial pharmacy knowledge for them to establish pharma industry and related areas
- Establishing and standardizing the preparations of siddha formulations and instruments using in the drug industry.

FIRST YEAR (Preliminary Examination)					
S.NO	**SUBJECT**	**THEORY**	**PRACTICAL/CLINICAL**	**VIVA**	**TOTAL MARKS**
1.	PAPER –I Research Methodology and Bio -Medical Statistics	100	Minor Project - 100(Submission of report -60 marks, Publication/Presentatin -20 marks, Oral-20 Marks)	--	200
2.	PAPER –II Basics and Modern aspects of Siddha Materia Medica	100	100 (Practical 70+Oral 30)	50	250
SECOND YEAR					
	Essential: Obtain CME credit points through Seminars/Workshops/Conferences(National/International) **Desirable:** Publication/ Visits or internship at Industry / Lab / Research institute /other AYUSH Institutions/ Journal club/ Teaching under graduate students				
THIRD YEAR (Final Examination)					
S.NO	**SUBJECT**	**THEORY**	**PRACTICAL/CLINICAL**	**VIVA**	**TOTAL MARKS**
1.	PAPER –I Gunapadam Mooligai with Medicinal Chemistry	100	100 (Practical 70+Oral-30)	50	250
2.	PAPER –II Gunapadam Thathu, Jeevam with Medicinal Chemistry	100	100(Practical 70+Oral-30)	50	250
3.	PAPER –III Pharmaceuticals and Regulations	100	100 (Practical 70+Oral-30)	50	250
4.	PAPER –IV Essentials in Pharmacology	100	100 (Practical 70+Oral-30)	50	250

Dissertation: Maximum marks will be 100 and Minimum marks for passing will be fifty percent.

FIRST YEAR

PAPER- I RESEARCH METHODOLOGY AND BIO-MEDICAL STATISTICS

CLINICAL RESEARCH METHODS UNIT-I

- Measures of disease frequency
- Measures of association/impact in clinical research
- Measurement errors in clinical research
- Validity in clinical research
- Bias in clinical research
- Descriptive bio-statistics
- Inferential bio-statistics
- Formulating research question
- Descriptive studies
- Analytical studies
- Pre-clinical studies
- Experimental studies
- Sampling and sample size estimation
- Survival analysis

CLINICAL RESEARCH METHODS UNIT-II

- Bio-medical literature search / Organization of Literature search (Zoteroetc)
- Developing data collection instruments/Case Record Form (CRF)
- Developing analysis plan
- Use of statistical software for data analysis
- Writing protocol: Principles and Guidelines
- Ethics in clinical research (Siddha, International/National)
- Scientific writing/ Writing the Dissertation (Including University Guidelines)
- Scientific presentation (oral/visual/poster)
- Case report writing / presentation
- Journal critique
- Writing research grants
- Comparative study of traditional medical systems (specifically Chinese, Ayurveda, Homeopathy, Unani)
- Mentorship
- Pedagogic methods

CLINICAL RESEARCH METHODS UNIT-III

- Introduction to National health programmes/health system including AYUSH
- Indian health/medical research systems/bodies including AYUSH ICMR, CCRAS, CCRS, Clinical Trials Registry of India etc

- Orientation to National clinical research guidelines/regulatory bodies CDSCO/DCGI/NABH/QCI Indian GCP for ASU
- Drug standardization as per Pharmacopoeial Laboratory for Indian Medicine (PLIM)
- International guidelines ICH-GCP; WHO guidelines for traditional medicine; WHO/OECD guidelines for animal studies

CLINICAL RESEARCH METHODS UNIT-IV (MINOR PROJECT)

- Cross-sectional study (Hospital-based)
- Patients; Care-takers; Physicians
- Cross-sectional study (Community-based)
- Local traditional health traditions, including traditional bone-setting
- Community (including tribal populations)
- Studies using qualitative research methods
- Clinical epidemiological studies (Hospital-based)
- Secondary data analysis of clinical data with report
- Case report/Case-series writing
- Systematic review
- Literary research
- Comparative study of traditional medical systems
- Report on visit to industry / entrepreneurship ideas
  Publication of any of the above work will get 20 marks

References:

S.No.	Name of the book, Language, Publishers & Year of publication	Author
1	Health research methodology: A Guide for Training in Research Methods, (English), Second Edition, World Health Organization, Manila, 2001	World Health Organization
2	General Guidelines for Methodologies on Research and Evaluation of Traditional Medicine, (English), First Edition, World Health Organization, 2000	World Health Organization
3	Designing clinical research. (English), Third Edition, Philadelphia: Lippincott Williams and Wilkins; 2013	Hulley SB, Cummings SR, Browner SR, Grady D, Newman TB
4	Biostatistics – Principles and Practice, (English), Elsevier, 2017	B Antonisamy, Solomon Christopher, Prasanna Samuel

PAPER–II BASICS AND MODERN ASPECTS OF SIDDHA MATERIA MEDICA

PART A: MEDICINAL BOTANY

Unit- I: INTRODUCTION TO MEDICINAL BOTANY AND HERBAL PHARMACOGNOSY.

Unit-II: ETHNOBOTANY AND ETHNOPHARMACOLOGY
Ethnobotany in Herbal Drug Evaluation
Ethnopharmacology in Drug Evaluation
New Developments in Herbals
Drug Discovery from Natural Products

Unit -III: ADULTERATION AND DETERIORATION
Types of Adulteration or Substitution of Herbal Drugs
Causes and Measures for Adulterations
Deterioration of Herbal Drugs
Control Measures for Deterioration

Unit- IV: FACTORS AFFECTING HERB QUALITY
Quality Standards of Herbal Products
Factors Relating To Quality of Herbal Drugs
Quality Assurance of Herbal Drugs
Determination of Foreign Matter
Good Agriculture Practice

Unit-V: DEVELOPMENT OF STANDARDIZATION PARAMETERS
General Information
Determination of Solvent Extractive Values
Determination Ash Values
Determination of Total Solids
Determination of Crude Fiber
Determination of Moisture Content
Determination of Essential Oils in Crude Drugs
Determination of Tannins
Determination of Arsenic and Heavy Metals
Pesticides
Steroids
Carbohydrates and their Analysis

Unit-VI: EXTRACTION OF HERBAL DRUGS
Introduction
Basic Principles and Rationale
Pre Extraction Operations for Crude Drugs
Effect of Solvent, Solvent Mixtures and Solution on Extraction
Characteristics of Phytoconstituents
Procedures for Extraction of Herbal Drugs
Interfering Compounds In Extraction of Desired Phytoconstituents

Extraction Methods for Specific Phytochemical Groups
Treatment of Drug Residue after Extraction

Unit-VII STANDARDIZATION OF BOTANICALS(MEDICINAL PLANTS)
Distribution and Description of the Medicinal Plant
Chemical Constituents of the Medicinal plant
Pharmacological and Biological Activities
Clinical Research
Therapeutic Indications
Uses
Dosage
Toxicity and Safety Aspects
Contra-indications / Cautions

PART B:

BRIEF STUDY ON 'METALS. MINERALS, ANIMAL PRODUCTS AND ITS BY PRODUCTS'

Unit-VIII: METALS AND MINERALOGY IN SIDDHA SYSTEM OF MEDICINE

1. Brief introduction of Physical and Chemical properties of following metals:
   1. Gold 2. silver, 3. Copper, 4.Zinc, 5.Steel (Ehgu), 6. Iron, 7. Bronze
   8. Brass, 9. Thara (alloy of copper and lead), 10. Lead, 11.Stannum (tin)
   - Brief introduction of Physical and Chemical properties of Mercury
   - Mineralogy-the Science, definition of mineral. Mineral as crystalline component part of a rock.Importance of minerals.
   - Crystallography – Crystallinity in minerals, Concept of crystal symmetry and crystal systems.
2. Brief Physics and Chemistry of Minerals :
   - Classification of minerals.
   - Crystal chemistry – chemical bonds, ionic-radius and coordination, isomorphism and solid solution; polymorphism.
   - Scalar properties of minerals and their determination : density, colour, streak, magnetism, radioactivity.
   - Vector properties of minerals, terminologies and determination – luster, cleavage, fracture, parting hardness, luminescence, electrical is it a vector property.
   - Habit and forms of crystalline aggregate.
3. Important rock-forming mineral groups – their classification, members, diagnostic properties and mode of occurrence.

   1. Olivine
   2. Pyroxene
   3. Amphibole
   4. Phyllosilicates
   5. Feldspar
   6. Zeolites
   7. Quarts
   8. Other common silicate minerals
   9. Important non-silicates (Oxider, sulfur, Phosphate, Carbonate etc.)
   10. Precious and Semiprecious stones.

ANIMAL PRODUCTS AND IT'S BY PRODUCTS

Unit- IX: A brief knowledge about Zoological classification – habit – description – reproduction – behaviour – food habits, conservation – Life span – communication – Eco system - Economic Importance – of animals used in Siddha Medicine.

Unit-X: Detailed study about the medicinally useful parts for the following :

1. Milk	:	Cow, Goat,Buffalo, Human.
2. Hoof	:	Goat, Sheep, Horse, Buffalo.
3. Egg	:	Hen, Musuru (red ant).
4. Shell	:	Crab, fresh water muscle, Snail, Pearl oyster, Conch shell (Shangu) Common oyster.
5. Horns	:	Goat, Sheep
6. Bone	:	Goat
7. Meat	:	Goat, Hen, Fish(Kaili), Earthworm
8. Korajanam	:	Cow.
9. Ghee	:	Cow, Goat, Buffalo
10. Feathers	:	Hen
11. Honey	:	Honey and its types
12. Urine	:	Goat, Cow
13. Dung	:	Cow, Goat.
15. Blood	:	Hen, Rabbit.
16. Excretion	:	Kathuri

PRACTICAL

Major practical

Phytoconstituents and their analysis

1. Qualitative Analysis of Crude Drug Extracts and Isolates
2. Alkaloids and Their Analysis
3. Volatile Oils, Spices and their Analysis
4. Fixed Oils Fats and Waxes
5. Phenylpropanoids and their Analysis
6. Flavonoids
7. Resins and Resinous Plant Drugs and their Analysis
8. Tannins and their Analysis
9. Terpenoids and their Analysis
10. Glycosidal Components and their Analysis
11. Fluorescent Substances and their Analytical Parameters
12. Colouring Matters and their Analysis
13. Proteinaceous Components and their Analysis

Minor practical:

Identification of raw drugs from Metal, Mineral , Zoological products including marine products in Siddha System of Medicine

References:

S. No	Name of the Reference Book, laungage, publications &year	Author
1	Quality Control Of Herbal Drugs, Business Horizons Pharmaceutical Publishers	Dr.Pulok K. Mukherjee, Ph.D
2	Standardization of Botanicals, Eastern Publishers- New Delhi-2004	Dr.Rajpal
3	Text Book of Mineralogy, Reprint CBS Publishers Bangalore.	E.S. Dana, John Willy & Sons
4	Grzimek's Animal Life Encyclopedia: Mammals	Grzimek, B
5	A Handbook of The Mammals of India.	Saurabh Mittal.
6	Fishes of India Vol, I II	Francis Day.
7	Snakes of India, Macmillan india Ltd.	Romulus Whitaker and Ashok Captain
8	General and applied Entomolgy	K.K. Nayar
9	Principles of Mineralogy, CBS Publishers Bangalore.	Rutely
10	Rock forming Minerals,Long man group Limited, London 1988	Deer, Howice and Zusman
11	Gunapadam – Mooligai Vaguppu	Dr. Murugesamudaliar Redirected by Dr. S. Govindaswamy
12	Materia Medica – Vol, I & II	Dr.Natkarani
13	Text of Gunapadam – Thaathu Jeeva Vaguppu – Vol. II & III	Dr.R.Thiagarajan, L.I.M
14	Wealth of India, 1-9 volumes, National institute of science communication and information resources, council of scientific & industrial research –New delhi.	
15	Sampasivam pillai agarathi	Mr.T.V.Sampasivam pillai

THIRD YEAR

PAPER - I GUNAPADAM MOOLIGAI WITH MEDICINAL CHEMISTRY

GUNAPADAM – MOOLIGAI VAGUPPU (METRIA MEDICA – HERBAL ORIGIN)

1. Introduction: - properties of drug- Taste, character, potency, postabsorptive changes (Vibagam)Specific action (Prabhavam)
2. Study about medicinal chemistry and therapeutic actions with few examples
3. Formulation related with mooligai single or compound preparations

	TAMIL NAME		BOTANICAL NAME
1.	Agatti	-	Sesbania grandiflora
2.	Agil	-	Aquilaria agallocha roxb
3.	Akkarakaram	-	Anacylus pyrethrum DC
4.	Akrottu	-	Juglans regia linn
5.	Asogu	-	Saraca asoca
6.	Athimathuram	-	Glycyrrhiza glabra
7.	Athividayam	-	Aconitum heterophyllum
8.	Atti	-	Ficus racemosa
9.	Akasathamarai	-	Pistia stratiotes
10.	Anthimalli	-	Mirabilis jalapa
11.	Abini	-	Papaver somniferum
12.	Amukkurakkizhangu	-	Withania somniferum
13.	Amman pachcharisi	-	Euphorbia pilurifera
14.	Ammaiyar Koondal	-	Cuscuta reflexa
15.	Arasu	-	Ficus religigiosa
16.	Arathai	-	Alpinia galangal
17.	Arival mooku patchilai	-	Sida acuta
18.	Arunelli	-	Phyllanthus acidus
19.	Alari	-	Nerium odorum
20.	Alisi virai	-	Linum usitatissimum
21.	Alli	-	Nymphaea nouchali
22.	Avarai	-	Lablab purpurens
23.	Avuri	-	Indigofera tinctoria
24.	Azhavanam	-	Lawsonia inermis
25.	Azhinjil	-	Alangium salvifoliure
26.	Arugambul	-	Cynodon dactylon
27.	Arukirai	-	Amarantus tristis
28.	Aruvada	-	Ruta chalepensis
29.	Annasipazham	-	Ananas cosmos
30.	Annasipoo	-	Illiceum verum
31.	Akasagarudan	-	Corallocarpus epigaeus
32.	Adathodai	-	Justica adathoda
33.	Adutheendapalai	-	Aristolochia bracteolate
34.	Adaiyotti	-	Pupalia orbiculata
35.	Athandam	-	Capparis zeylanica

36.	Amanakku	-	Ricinus communis
37.	Chitramanakku	-	
38.	Peramanakku	-	Ricinus inermis
39.	Chevvamanakku	-	Ricinus tanarius
40.	Ayil	-	Chukrasia tabularis
41.	Araikirai	-	Marsilea quadrifolia
42.	Alamaram	-	Ficus benghalensis
43.	Alpagoda pazham	-	Prunus domestica
44.	Aavarai	-	Cassia auriculata
45.	Alivirai	-	Lepidium sativum
46.	A-vallikhichangu	-	Manihot crantz
47.	Artuthumatti	-	Citrullus colocynthis
48.	Atrunetti	-	Neptunia oleracea
49.	Anai-katrazhai	-	agave Americana
50.	Anai kunri	-	Adenanthera pavonina
51.	Anaippuliamaram	-	Adansonia digitata
52.	Iruvi	-	Dryopteris felixmas
53.	Isangu	-	Clerodendrum inerme
54.	Isappukolvidai	-	Plantago ovata
55.	Inji	-	Zingiber officinale
56.	Indu	-	Mimosa rubicaulis
57.	Iththi	-	Ficus microcarpa
58.	Impural	-	Oldenlandia umbellate
59.	Rattai – peimarutti	-	Anisomeles malabarica
60.	Rattabolam	-	Aloe barbadensis
61.	Ireval chini	-	Rheum emodi
62.	Ilanda maram	-	Ziziphus mauritiania
63.	Lavangam	-	Syzygium aromaticum
64.	Lavangappattai	-	Cinnamomum verum
65.	Ilavamaram	-	Bombax ceiba
66.	Ilavu	-	Bombax malabaricum
67.	Iluppai	-	Madhuca longifolia
68.	Ilaikalli	-	Euphorbia ligularia
69.	Eechu (Sitrechu)	-	Phoenix sylvestris
70.	Perechu	-	Phonex dactilifera
71.	Echchura mooli	-	Aristolochia indica
72.	Ezhathalari	-	Plumeria rubra
73.	Uka	-	Salvadora persica
74.	Usilamaram	-	Albizia odoratissima
75.	Uttamani	-	Pergularia extensa / Daemia extensa
76.	Uppilangodi	-	Mimosa paniculata
77.	Rudra jadai	-	Ocimum basilicum
78.	Rudraksham	-	Elacocarpus sphaericus
79.	Urulai kizhangu	-	Solanum tuberosum
80.	Uzhundu	-	Vigna mungo
81.	Umaththai	-	Datura metal
82.	Karu umaththai	-	Datura stramonoides
83.	Uzhalatri	-	

84.	Etti	-	Strychnos nux-vomica
85.	Erisalai	-	
86.	Erukku	-	Calotropis gigantea
87.	Elikkadilai	-	Merremia emarginata
88.	Eliyamanakku	-	Jatrophacurcas
89.	Elumichai	-	Citrus lomon
90.	Elumichan	-	Ocimum gratissimum
91.	Ezhuttani poondu	-	Launaca pinnatifida
92.	Ellu	-	Sesamsum indicum
93.	Elam	-	Elettaria cardamomum
94.	Chitrelam	-	Elettaric regains
95.	Kattu – elekkay	-	Amomum subulatum
96.	Malayelam	-	
97.	Ezhilapalai	-	Alstonia scholaris
98.	Iyvirali	-	Diplocyclos palmatus
99.	Odukkan	-	Cleistanthus collinus
100.	Udimaram/Odimaram	-	Lannea coromandelica
101.	Omam	-	Carum copticum
102.	Kurosani omam	-	Hyoscyamus niger
103.	Oritazhttamarai	-	Ionidium suffruliocosum
104.	Orilai tamarai	-	Nervilia aragoana
105.	Kakkarikkay	-	Cucumis sativa
106.	Kasa-kasa	-	Papaver somniferum
107.	Kanja	-	Cannabis sativa
108.	Kadambu	-	Anthocephalus cadamba
109.	Kadalazhinjil	-	Salacia reticulate wight
110.	Kadalai	-	Cicer arietinum
111.	Kadarpasi	-	Gracilaria lichenoides
112.	Kadarpalai	-	Argyreianeryosa
113.	Kadar tengay	-	Lodoicea maldivica
114.	Kadara naraththai	-	Citrus medica
115.	Chengadugu	-	Brassica juncea
116.	Vengadugu	-	Brassica alba
117.	Kadugu rokani	-	Picrorhiza scrophulariflora
118.	Kadukkai	-	Terminalia chebula
119.	Kattukodai	-	Cocculus hirsutus
120.	Kanap-pundu	-	Exacum pedunculatum
121.	Kandangkattari	-	Solanum surattense
122.	Kanduparangi	-	Clerodendron serratum
123.	Kathakambu	-	Uncaria gambir
124.	Kasthuri manjal	-	Curcuma aromatica
125.	Kamuku	-	Areca catechu
126.	Kambu	-	Pennisetum typhoideum
127.	Kottaikaranthai	-	Spheranthus indicus
128.	Kaththari	-	Solanum melongena
129.	Karisalankanni	-	Eclipta prostrate
130.	Karungali	-	Acacia catechu
131.	Karunai thandu	-	Amiphophallus paeconii folius
132.	Karppuravalli	-	Aniso chilus carnosus

133.	Karumbu	-	Saccharum officinarum
134.	Karkadaga shingi	-	Rhus succedanea
135.	Kalapai kizhangu	-	Gloriosa superba
136.	Kaliyana pushnikkay	-	Benincasa hispida
137.	Kaliyana murukku	-	Erythrina variegate
138.	Kalumichchankai	-	Kalumi – chchankai
139.	Kavizh thumbai	-	Trichodesma indicum
140.	Kazharchi kodi	-	Caesaplinia bonduc
141.	Kazhu-nir	-	Nymphaea alba
142.	Kalarva	-	Salvadora persica
143.	Chirukalarva	-	Salvadora persica
144.	Kala	-	Carissa carandas
145.	Kalippakku	-	Areca catechu
146.	Kalli	-	Euphorbia ligularia
147.	Kodikkalli	-	Sarcosemma brevistigma
148.	Shadhurakkalli	-	Euphorpia antiquorum
149.	Kalli-mulayan	-	Stapelia virgata
150.	Kari-vembu	-	Murraya koenigii
151.	Karimulli	-	Solanum anguivi
152.	Karkovai	-	Melothria heterophylla
153.	Karpasi	-	Parmelia perlata
154.	Kartamarai	-	Smilax zeylanica
155.	Katrazhai	-	Aloe barbadensis
156.	Kariatoiam	-	Aloe littoralis
157.	Kakkanam	-	Clitoria ternatea
158.	Kakkai Kolli	-	Anamirta cocculus
159.	Kasa	-	Memecylon umbellatium
160.	Ratnam	-	Quamoclit pennata
161.	Kanchori	-	Tragia involucrata
162.	Kattatti	-	Bauhinia tommentosa
163.	Kattamanakku	-	Jatropha curcas
164.	Kattu elumichchai	-	Atalantia malabarica
165.	Kattu ellu	-	Sesamum prostratum
166.	Kattu kadugu	-	Cleome viscosa
167.	Kattukkaruvappatai	-	Cinnamomum iners
168.	Kattuthumatti	-	Cucumis trigonus
169.	Kattu pagal	-	Momordica dioica
170.	Kattu peipudal	-	Trichosanthes lobata
171.	Kattu mullangi	-	Blumea lacera
172.	Kattu Vengayam	-	Urginea indica
173.	Kappikkottai	-	Coffea arabica
174.	Kai-vallikkodi	-	Dioscorea alata
175.	Karamani	-	Vigna unguiculata
176.	Karai	-	Catunaregum spinosa
177.	Karpokarisi	-	Psoralea corylifolia
178.	Kavattambul	-	Cymbopogon martini
179.	Kalan	-	Agaricus campestris
180.	Kanam vazhai	-	Commelina benghalensis
181.	Kitchilikizhangu	-	Curcuma zedoaria

182.	Kitchilippazham	-	Citrus aurantium
183.	Kiranthitakaram	-	Tabernaemontana divaricata
184.	Kiranthinayagam	-	Ruelia prostrata
185.	Kiliyural	-	
186.	Kilukiluppai	-	Crotalaria retusa
187.	Keerippundu	-	Ophiorrhiza mungos
188.	Kiraikal	-	Greens
189.	Puthina	-	Mentha arvensis
190.	Puliyarai	-	Oxalis corniculata
191.	Manalikkirai	-	Gisekia pharnaceoides
192.	Kiraithandu	-	Amaranthus gangeticus
193.	Kizhanelli	-	Phyllanthus amarus
194.	Kungilium	-	Shorea robusta
195.	Kungumappoo	-	Crocus sativus
196.	Kudasapali	-	Holarrhena pubescens
197.	Kudiyottupoondu	-	Argemone mexicana
198.	Kunthrikkam	-	Boswellia serrata
199.	Kuppeimeni	-	Acalypha indica
200.	Kumizhmaram	-	Gmelina arborea
201.	Kumkkath-thi	-	Hiptage benghalensis
202.	Kuruvich-chi	-	Ehretia microphylla
203.	Kuruver	-	Vetiveria zizanoides
204.	Kurattai	-	Trichosanthes tricuspidata
205.	Kurinjam	-	Gymnema sylvestre
206.	Kuntri	-	Abrus precatorius
207.	Kuth-than-Kuthambai	-	Lantana indica
208.	Kuntharpanai	-	Caryota urens
209.	Kuvaikkizhangu	-	Maranta arundinacea
210.	Kezhvaragu	-	Eleusine coracana
211.	Kodiveli	-	Plumbago indica
212.	Chenkodiveli	-	Plumbago rosea
213.	Kottikkizhangu	-	Aponogeton monostachyon
214.	Kothavarai	-	Cyamopsis tetragonoloba
215.	Koththumalli	-	Coriandrum sativum
216.	Kollu	-	Macrotyloma uniflorum
217.	Kollukkaivelai	-	Tephrosia purpurea
218.	Korukkaip-puli	-	Pithecellobium duice
219.	Konrai-Sarak-Konrai	-	Cassia fistula
220.	Sirukonrai	-	Cassia arborescens
221.	Senkonrai	-	Cassia margiuata
222.	Kottam	-	Costus speciosus
223.	Kodaga salai	-	Rungia repens
224.	Kothumai	-	Triticum aestivum
225.	Gopuram tangi	-	Andrographis echioides
226.	Korai	-	Cyperus rotandus
227.	Kovai	-	Coccinia grandis
228.	Gowrivalpul	-	
229.	Jadamanji	-	Nagrandiflora
230.	Chanappu	-	Crotalaria juncea

231.	Shanbagam	- Michelia champaca
232.	Chathakuppai	- Anethum graveolens
233.	Chcharanai	- Trianthema Portulacastrum
234.	Chandanam	- Santalum album
235.	Sanni-nayakam	- Aloe vera
236.	Savukku-maram	- Casuarina equisetifolia
237.	Sathikkai	- Myristica fragrans
238.	Chathipaththiri	- Myristica fragrans
239.	Shamantipoo	- Chrysanthemum coronarium
240.	Chamai	- Panicum sumatrense
241.	Shambirani	- Styrax benzoin
242.	Chayamaram	- Caesalpinia sappan
243.	Chavarisimaram	-
244.	Charapparuppu	- Buchanania lanzan
245.	Shalamishiri	- Orchis latifolia
246.	Shivadai	- Operculina turpethum
247.	Shivanar vembu	- Indigofera aspalathoides
248.	Chirunagappu	- Mesua nagassarium
249.	Chirupeyathi	- Ficus hispida
250.	Chitramutti	- Pavonia zeylanica
251.	Peramutti	- Pavonia odorata
252.	Chinni	- Acalypha fruticosa
253.	Chinnikkizhangu	-
254.	Cheekkai	- Acacia sinuate
255.	Seetha	- Annona squamosa
256.	Seendil	- Tinospora cordifolia
257.	Por-seendil	-
258.	Shimai atti	- Ficus carica
259.	Chirakam	- Cyminum
260.	Karuinjchirakam	- Nigella sativa
261.	Perunjchirakam	- Pimpinella anisum
262.	Kattu chirakam	- Veronia-anthelmintico
263.	Chukkankai	-
264.	Chukkanghkirai	- Rumex vesicarius
265.	Chukku	- Zingiber officinale
266.	Sundai	- Solanum torvum
267.	Churai	- Lagenaria siceraria
268.	Chulukku nayagam	-
269.	Suriyakanthi	- Helianthus annus
270.	Cheppu – nerunjil	- Indigofera enneaphylla
271.	Chemparattai	- Hibiscus rosa-sinensis
272.	Chemparuthi	- Gossypium arboretum
273.	Chempai	- Sesbania sesban
274.	Cheruppadai	- Mollugo lotoides
275.	Chevuiyam	- Piper nigrum
276.	Chembu	- Colocasia esculenta
277.	Cherangkottai	- Semecarpus anacardium
278.	Chevaganar kizhangu	- Gloriosa superba
279.	Cholam	- Sorghum vulgare

280.	Thagarai (Usithagarai)	- Cassia tora
281.	Peyavarai	- Cassia occidentalis
282.	Thakkali	- Physalis minima
283.	Manaththakkali	- Solanum nigrum
284.	Takkol	- Illicium verum
285.	Thannirvittan kizhangu	- Asparagus racemosus
286.	Tamaraththam	- Averrhoa carambola
287.	Thara	- Fumaria parviflora
288.	Tharuppai	- Desmostachya bipinnata
289.	Thavasu murungai	- Rungia parviflora
290.	Thazhuthazhai	- Clerodendrum phlomoidis
291.	Thamarai	- Nelumbo nucifera
292.	Thazhai	- Pandanus odoratissimus
293.	Thalisa-paththiri	- Abies spectabilis
294.	Thalippanai	- Corypha umbraculifera
295.	Thantri	- Terminalia bellirica
296.	Thippili	- Piper longum
297.	Thippili ver	- Piper longum
298.	Thrakshi	- Vitis vinifera
299.	Thillai	- Excoecaria agallocha
300.	Tinai	- Setaria italica
301.	Thuththi	- Abutilon indicum
302.	Thuvarai	- Cajanus cajan
303.	Thumblikkai	- Diospyros peregrine
304.	Thumbai	- Leucas aspera
305.	Thurunjibin	- Alhagi maurorum
306.	Thulasi	- Ocimum sanctum
307.	Thuthuvalai	- Solanum trilobatum
308.	Thenku-maram	- Cocos nucifera
309.	Thekku	- Tectona grandis
310.	Telkodukku	- Heliotropium indicum
311.	Devadaru	- Cedrus deodara
312.	Thettvan	- Strychnos potatorum
313.	Thottar Chinungi	- Mimosa pudica
314.	Nancharuppan	- Tylophora indica
315.	Naththaichuri	- Spermacoce hispida
316.	Naralai	- Cayratia pedata
317.	Nanthiyavattam	- Tabernaemontana divaricata
318.	Naruvili	- Cordia dichotoma
319.	Nannari	- Hemidesmus indicus
320.	Naganam	-
321.	Nagathali	- Opuntia dilienii
322.	Nagamaki	- Rhinacanthus nasuta
323.	Nanal	- Saccharum spontaneum
324.	Nabi	- Aconitum napellus
325.	Nayuruvi	- Achyranthes aspera
326.	Naval	- Syzygium cumini
327.	Nilakkadambu	- Asarum curopaeum
328.	Nilakumizh	- Gmelina asiatica

329.	Nilappanai	- Curculigo orchioides
330.	Nilavembu	- Andrographis paniculata
331.	Nilavamanakku	-
332.	Nila varai	- Cassia senna
333.	Nintral cinungi	-
334.	Neeradimuttu	- Hydnocarpus laurifolia
335.	Niralari	- Polygorum barbatum
336.	Nirbrahmi	- Bacopa monnieri
337.	Nirpoola	- Phyllanthus reticulates
338.	Nirmulli	- Hygrophila auriculata
339.	Nirmel neruppu	- Ammania baccifera
340.	Nuna	- Morinda tinctoria
341.	Nettilingam	- Polyalthia longifolia
342.	Neichatti	- Vernonia cinerea
343.	Neithar kizhangu	- Nymphea pubescens
344.	Nerunjil	- Tribulus terrestris
345.	Nel	- Oryza sativa
346.	Nelli	- Phyllanthus emblica
347.	Nervalam	- Croton tiglium
348.	Notchi	- Vitex negundo
349.	Payaru	- Vigna mungo
350.	Paruththi	- Gossypium herbaceum
351.	Pachillai	- Garcinia xanthochymus
352.	Pannimonthan kizhangu	- Trapa natans
353.	Pappali	- Casica papaya
354.	Motchai	- Lablab purpureus
355.	Chemparuththi	- Gossypium arboretum
356.	Pala	- Artocarpus heterophyllus
357.	Palasu	- Butea monosperma
358.	Pallipundu	- Striga lutea
359.	Parangikai	- Cucurbita maxima
360.	Parangippattai	- Smilax china
361.	Parppatakam	- Hedyotis coryambose
362.	Panai	- Horastrus flabellifer
363.	Panirpu	- Rosa centifolia
364.	Pakal	- Momorchica charantia
365.	Badampisin	-
366.	Pathiri	- Stereospermum colais
367.	Barely	- Hordeum vulgare
368.	Paalai	- Manikara hexandra
369.	Vetpalai	- Wrightia tinctoria
370.	Pirappan kizhangu	- Calanus rotang
371.	Piramiya cazhukkai	- Bacopa monnieri
372.	Piray	- Streblus asper
373.	Pilimbi	- Averrhoa bilimbi
374.	Pilavai kolli	-
375.	Pitharoghani	- Coptis teeta
376.	Pinasimaram	- Sterculia foetida
377.	Pavattai	- Pavetta indica

378.	Pidangunari	- Prenma tomentosa
379.	Pirandai	- Cissus quadrangularis
380.	Chirupelai	- Aerva lanata
381.	Pugaiyilai	- Nicotiana tobacum
382.	Pungu	- Pongamia pinnata
383.	Pudal	- Trichosanthes cucumerina
384.	Pulluruvi	- Dendrophthoe falcate
385.	Puli	- Tamarindus indica
386.	Pulladi	- Desmodium gangeticum
387.	Punnai	- Calophyllum inophyllum
388.	Puvarasu	- Thespesia populnea
389.	Poonaikali	- Mucuna pruriens
390.	Perungayam	- Ferula asafetida
391.	Poduthalai	- Phyta nodiflora
392.	Ponmusuttai	- Sida acuta
393.	Ponnanganni	- Alternanthera sessils
394.	Magizh	- Mimusops elengi
395.	Mangusthan	- Gareinia mangostana
396.	Manjal	- Curcuma longa
397.	Mara manjal	- Coscinium fenestratum
398.	Manjitti	- Rubia cordifolia
399.	Manippunge	- Sapicdua lausidoliz
400.	Madanakamappu	- Cucas circinalis)
401.	Mantharai(red)	- Bauthinia Purpurea
402.	Malli	- Jasminum grandiflorum
403.	Marakarai	- Catunaregum spinosa
404.	Maruthu	- Terminalia arjuna
405.	Ma	- Mangifera infica
406.	Machikkai	- Quercus infectoria
407.	Masipathisi	- Artemisia nilagirica
408.	Mathalai	- Punica granatum
409.	Milagu	- Piper nigrum
410.	Val milagu	- Piper cubeba
411.	Musarkathilai	- Ippmea pea caprae
412.	Mavilangu	- Creteave magna
413.	Milakaranai	- Toddalia asiatica
414.	Mussumuskkai	- Mukia madraspatana
415.	Mudakkattan	- Cardiospermum helicacabum
416.	Mundthiri	- Anacardium occidenbtale
417.	Murungai	- Moringa oleifera
418.	Mulam	- Citrullus Vulgaris
410.	Mullangi	- Raphanus sativus
420.	Munnai	- Premna corymbosa
421.	Mukkirattai	- Boerhaavia diffusa
422.	Mungil	- Bambusa arundinacea
423.	Vasambu	- Acorus calamus
424.	Modagavalli	- Sterculia foetida
425.	Vandukolli	- Cassia alata
426.	Varagu	- Pzspalum scrobiculatum

427.	Valampursikkai	- Helicteres isora
428.	Vallarai	- Centella assiatica
429.	Valli	- Dioscorea esculenta
430.	Chevaalli Kodi	- Dioscorea purpurea
431.	Vallaikodi	- Convplvulus repens
432.	Vagai	- Albizia lebbeck
433.	Karuvagai	- Albizia ordoratissina
434.	Vathanarayanan	- Delonix elata
435.	Vadhuniai	- Prunus dulcis
436.	Vaivilangum	- Embelia ribes
437.	Valuzhuvai	- Celastrus paniculatus
438.	Vazhai	- Musa paradisiaca
439.	Valendrabolem	- Commiphora myrrha
440.	Vidathassi	- Dichrostachys cinerea
441.	Virali	- Dodonaea viscosa
442.	Vilvam	- Aegle marmeoles
443.	Vilamichuver	- Plectranthus vettiveroides
444.	Vizhlorisi	- Seed of reed grass
445.	Vizhudi	- Cadaba trifoliate
446.	Vilamaram	- Limonia acidissima
447.	Vishamunti	- Crinum asinoides
448.	Vishnukirranti	- Evolvulus assinodies
449.	Perilavangappattai	- Cinnamomunm macrocarpum
450.	Peyatti	- Ficus hsipida
451.	Vendayam	- Allium cepa
452.	Vetchi	- Ixora coccinea
453.	Vendaikkai	- Abelmoschus esculetus
454.	Vendayam	- Trigonella foenun graecum
455.	Vellarikkai	- Cucumis sativus
456.	Vellarugu	- Enicostemma axillare
457.	Vellilothram	- Symplocos racemosa
458.	Velluli	- Allium sativam
459.	Vetrilai	- Piper betle
460.	Vengai	- Pterocarpus marsupium
461.	Vembu	- Azadirachta indica
462.	Venkadalai	- Arachis hypogaea
463.	Vel	- Acacia nilotica
464.	Velvel	- Acacia Leucophloea
465.	Kudaival	- Acacia latronum
466.	Pikkaruva	- Acacia farnesiana
467.	Valai	- Cleome viscosa
468.	Thaivelai	- Gynanadropsis gynandra

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PAPER II GUNAPADAM THATHU, JEEVAM WITH MEDICINAL CHEMISTRY

1. Introduction: - properties of drug Taste, character, potency, postabsorptive Changes (Vibagam) Specific action (Prabhavam)
2. Study about medicinal chemistry and therapeutic actions with few examples
3. Formulations related with Thathu and Jeevam prodcutss

I. Metals (Ulogangal):1.Ayam (Iron) 2. Ekkhu (Steel) 3. Kaareeyam (Lead) 4. Kandham (Magnetic Oxide of Iron) 5. Thambiram (Copper) 6. Nagam (Zinc) 7. Pithalai (Brass) 8. Thankam (Gold) 9. Mandooram (Ferrous Ferric Oxide) 10. Venkalam (Bronze) 11. Velleyam (Tin) 12. Velli (Silver).

II. Mercury& its salts (Pancha Sootham):1. Rasam (Mercury) 2. Rasa Chendooram (Red Sulphide of mercury) 3. Lingam (Cinnabar – Natural) 4. Rasa Karpooram (Calomel - Hydragyrum subchloride) 5. Veeram(Corrosive sublimate – Hydrogyrum per chloride).

III. Metal salts (Pashanangal)

Tamil Name	**English Name**
Anjanakal	Antimony
Kanthakam	Sulphur
Gowri pashanam	Yellow Oxide of arsenic(Synthetic)
Thalagam	Yellow Arsenic Trisulphide
Thottippashanam	A Pharmaceutical preparation of Arsenic with mercurry & sulphur.
Nava pashanangal	Nine kinds of metal salts
Pancha Pashanangal	Five kinds of metal salts.
Manosilai	Red Arsenic Disculphide (Realger)
Mirudhar sinki	Galena Sulphide (Lead ore)
Vellaiappashanam	Arsenum Acidum (White Arsenic)
IV.Salts (Karasaram):	
Appalakkaram	Sodium Carbonate impure
Induppu	Sodium Chloride Umpure (Rock Salt)
Evatcharam	Potassium Carbonate impure
Ekambacharam	A Prepared Salt (an efflorescent salt)
Kadal nurai	Sea froth engendered by submarine fire
Kanavai odu	OS SEPIAE (Cuttle fish bone)
Gandhiuppu	Salts of Sulphur
Gandhaga Ievanam	Salt obtained from sulphur, mixed with other ingredients (Consolidated sea salt)
Kalluppu	Salt found in lumps deposited on beds of rocks at the bottom of the sea.
Kariuppu	Sodium chloride (Common salt)
Karichulavanam	Salt produced from the earth impregnated with soda.
Kasi chcharam	A salt prepared from a mixture of three salts
Sathi chcharam	A prepared salt.
Sindhuppu	A kind of Rock Salt (It is formed naturally on Mountains the & rocks being solidified from the falling dew)
Cheenakkaram	Alum (Aluminous Sulphate)

Soodan	Camphor
Thilalavanam	A salt derived from sessamum.Navauppu mezhugu Waxy preparation comprises with salts
Navacharam	Ammonium chloridum (Sal ammoniac)
Pachai karpooram	Borneo camphor (Crude camphor)
Panchalavanam	Mixture of five salts
Pidalavanam	Black salt
Pooneeru	Fuller's earth
Ambar	Ambra arasea
Valaiyaluppu	Extracted salt from fuller's earth (Glass gall)
Vengaram	Sodium biborate (Borax)
Vediuppu	Potassium nitrate (Salt petre)
Attuppu	A boiled salt obtained from salt petre

V. Gems (Navamanigal):

Komedagam	Onyx (Berly)
Neelamani	Sapphire
Pavazham	Coral
Pushparagam	Topaz, Yellow Topaz
Maragadha	Emerald
Manickam	Ruby (Carbuncle)
Vaidooriyam	Cats eye (Chryso prase)
Variam	Diamond
Muthu	Pearl

VI. Minerals (Natural Substances) – Upa rasam

Appiragam	Mica
Annabedi	Ferri Sulphas (Green vitriol)
Karpoorasilasath	Crystalised foliated Gypsum
Kalnar	Asbestos
Karchunnam	Lime stone
Kadikkaram	Nitrate of silver
Kavikkal	Red ochre
Gomuthra silasath	Asphaltum (Asphalt mineral pitch)
Thurusu	Cupric sulphate (Blue vitriol)
Nandukkal	Fossil stone crab
Nimilai	Bismuth
Pal thutham	Sulphate of zinc

MATERIA MEDICA (ANIMAL KINGDOM):

1.	Attai	Hirudo Medicinalis (Speckled leech)
2.	Aamai	Chelonia Turtle (Tortoise)
3.	Alkattipakshi	
4.	Indrakopa poochi	Mutilla Occidentalis
5.	Iragugal	Feathers
6.	Udumbu	Varanum Sps (Monitor)

7.	Eri vandu	Mylabris Sps.
8.	Elumbugal	Bones
9.	Onan	Calotis (Common Agemaid Lizard)
10.	Kasthuri	Moschus moschiferus musk
11.	Kaandamiruga kombu	Rhinoceros unicornis
12.	Kilinjal	Ostrea edults linn (Common oyster shell)
13.	Kulambugal	Hoof
14.	Kulavikkoondu	Waps nest
15.	Kombarakku	Carteria Lacca (Lac)
16.	Kombugal	Horns
17.	Korojanam	Fel Bovinum purifactum (Oxbile)
18.	Kozhi	Gallus dometicus (Domestic cock & hen)
19.	Sangu	Turbinella rapa (Conch Shell)
20.	Chanam	Dung
21.	Siruneer	Urine
22.	Sura	Squalus carcharius (Shark)
23.	Thantham	Teeth
24.	Thean	Honey
25.	Nandu	Crab
26.	Nathai	Fresh Water Snail
27.	Nariecham	Jackal's excreta
28.	Palagarai	Cypraea moneta Linn (Cowry)
29.	Pambu chattai	Snake's slougle
30.	Palum pal porutkalum	Milk and milk products
31.	Pitchi	Bile
32.	Puli	Tiger
33.	Punugu	Viverra Civetta (Civet cat)
34.	Poonagam	Earth Worm
35.	Mayil	Pavo Cristatus Linn (Pea Cock)
36.	Maan	Deer
37.	Min mini poochi	Fire fly
38.	Muttai & oodugal	Egg & shells
39.	Musuru muttai	Egg of Formica Smaragdina
40.	Muthuchippi	Mytilus margaritiferus (Pearl Oyster Shell)
41.	Mezhugu	Wax
42.	Yanai	Elephas indicas (Elephant)
43.	Manpuzhu	Megascolax mauriti (Earthworm)

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PAPER III-PHARMACEUTICALS AND REGULATION

1. **Isolation of Compounds from Herbal Sources:**Basic constituents of plants (chemical classification). Isolation of active constituent from plant materials – Percolation and maceration. Qualitative constituent characterization techniques – Utilisation of HPTLC for the constituent analysis – Estimation of marker compound in biological fluid after crude plant material administration.

2. **Instrumentation in Drug analysis:**Qualitative testing. titrimetric analysis – Beer and Lambert's law – Basis and working principle of colorimeter, ultraviolet, atomic absorption spectrometers, Fluorescence spectroscopy, NMR and Mass Spectroscopy – Basics of Chromatography – Partition, adsorption and ion exchange chromatography – column chromatography – thin layer chromatography – paper chromatography – immunoabsorbant chromatography – high performance thin layer chromatography – high performance liquid chromatography and gas Chromatography – Radio immunoassay – Processing of biological materials for drug analysis – Calculations in drug analysis – Good laboratory practice – Validation of analytical procedure.

3. **Drug Regulations:**Drug Price Control order – application of Investigational New Drug (INF) – Application for New Drug Discovery (NND) according to DCGL (Drug Controller General of India) & US FDA guidelines – Conducting bio-equivalence studies – Ethical considerations in utilizing human subjects for drug discovery process – Helsinki's declaration – ICH-GCP Guidelines – Ethical guidelines in utilising animals for experimental purposes.

4. **Drug development process:**Methods involved in the development of new drugs. Preclinical toxicological studies. Calculation of LD 50 & ED 50. Acute, subacute and chronic toxicity studies. Irwin profile test, Pre-clinilcal pharmacokinetic and dynamic studies. Lipinski's rule for drug like molecule, High throughput screening (invitro and invivo) for pre-clinical pharmacokinetic and pharmacodynamic studies.

5. **Quality Control:**Systematic Study of Crude Drugs – Microscopical Methods of Examining Crude Vegetable Drugs – Determination of Stomatal Index / types of Stomata – Determination of Palisade Ratio – Determination of Vein-Islet Number – Determination of Stomatal Number – Foreign Matter and Determination of Foreign Matter – Determination of Total Ash – Determination of Acid Insoluble Ash – Determination of Water Soluble Ash – Determination of Sulphated Ash – Determination of Alcohol Soluble Extractive – Determination of Water Soluble Extractive – Determination of Ether Soluble Extractive (Fixed Oil Content) Determination of Moisture Content (Loss on Drying) – Determination of Volatile Oil in Drugs – Thin-Layer Chromatography (TLC) – Fatty oil estimation – Method for Alkaloid estimation – Determination of Powder Fineness – Determination of Refractive Index – Weight per Millilitre and Specific Gravity – Determination of Melting Range – Determination of Boiling Range – Determination of Optical Rotation – Disintegration test – Uniformity of weight – Determination of Viscosity – Determination of Total Solids – Determination of Saponification Value – Determination of Iodine Value – Determination of Acid Value – Determination of Peoxide Value – Determination of Unsaponifiable Matter – Detection of Mineral Oil

(Holde's Test) – Rancidity Test (Kries Test) – Determination of Reichert-Meissl and Polenske Value – Determination of Alcohol Content – Limit Test for Heavy Metals – Limit Test for Arsenic – Limit Test for Lead – Heavy Metals by Atomic Absorption Spectrophotometry – Inductively-Coupled Plasma Mass Spectrometry – Gas Chromatography – High Performance Liquid Chromatography – Pesticide Residues – Quantitative Analysis – Test for Aflatoxins – TLC method – Microbial Limit Tests – Total Aerobic Microbial Count – Tests for Specified Micro-Organisms.

6. **GMP (Good Manufactuering Practices):**Aspects of Good Manufactuering Practices – Process – Process Control – Irradiation – Sterilization – Requirements for Microbial Parameters as per International Pharmacopeias for Plant based materials – Extraction and Disitilization – Separation – Storage, Handling and Transporation – Technology options for quality assurance – Water supply – Raw materials – Factory Premises – Botanical identity – Seeds and other propagation materiasl – Modern Instrumental Techniques for Quality Assurance – Hyphenated Techniques – Spectroscopic techniques – Efficacy and Safety of drugs – Myths and Facts about Quality Assurance and GMP.

7. **The Drugs & Cosmetics Act:**Preliminary – The Central Drugs Laboratory – Import and Registration – Government Analysts, Inspectors, Licensing Authorities and Controlling Authorities – Sale of Drugs other than Homoeopathic Medicines – Manufacture for Sale or for Distribution of Drugs other than Homoeopathic Medicines – Manufacture for Examination, Test or Analysis – Labelling and Packing of Drugs other than Homoeopathic Medicines – Special provisions Relating to Biological and other Special products – Import or Manufacture of New Drug for Clinical Trials or Marketing – Manufacture of Cosmetic for Sale 3 or for Distribution – Labelling, Packing and Standards of Cosmetics – Approval of Institutions for carrying out tests on Drugs, Cosmetics and raw materials used in their manufacture on behalf of licensees for manufacture for sale of drugs/cosmetics – Manufacture for sale of Ayurvedic (Including Siddha) or Unani Drugs – Approval of Institutions for carrying out tests on Ayurvedic, Siddha and Unani drugs and Raw Materials used in their Manufacture on behalf of Licensees for manufacture for sale of Ayurvedic, siddha and Unani drugs – Labelling, Packing and Limit of Alcohol in Ayurvedic (including Siddha) or Unani drugs – Government Analysts and inspectors for Ayurvedic (including Siddha) or unani drugs – Standards of Ayurvedic Siddha and Unani drugs.

PRACTICAL

1. **Powders (Churna)**
   a) Particle size
   b) Bulk density
   c) Solubility
   d) Estimation of Foreign material
   e) Microbial load
   f) Moisture content
   g) Determination of ash value - total, water soluble and acid insoluble ash
   h) Solubility - water and alcohol

i) Extract values - water and alcohol
j) TLC

2. **Oil**
   a) Determination of Optical density
   b) Refractive Index

3. **Tablets**
   a) Uniformity in weight and size
   b) Tablet hardness
   c) Tablet friability
   d) Tablet disintegration
   e) Tablet dissolution

4. **Semisolid dosage forms**
   a) Moisture content
   b) Sugar content
   c) Microbial load
5. **Liquids**
   a) pH value
   b) Specific gravity

All practicals should be performed in accordance with Authoritative Text Books of Schedule-I of D.C.Act-1940.

All practicals related to Pharmacopoeial Standards should be performed in accordance with Methods Published in Protocol for testing of ASU Medicines and Laboratory Guidelines for the Analysis of Ayurveda & Siddha

References:

S.NO	NAME OF THE REFERENCE BOOKS/PUBLICATIONS/YEAR	AUTHOR
1	Siddha vaithiya thirattu, Indian medicine and homeopathy 2009	
2	Agathiyar chenduram 300, Thirumagal vilasa atchagam 2010	
3	Theryar thylar varga churukkam, Thaamarai publications 2007	
4	Theryar vaithya kaaviyam 1500, Thaamarai publications, Aug 2000	
5	Theryar vaithyam 1000, Thaamarai publications Apr 1999	
6	Theryar vaakadam, Thaamarai publications Oct 2000	
7	Therya Yamaha venba, Indian medicine and homeopathy 2003 & 1997	
8	Agathiyar Vaidhya Rathina Surukkam, Shree shenbaga publications 2002	

9	Gunapadam –Dhathu jeeva vaguppu, Indian medicine and homeopathy 2004	
10	Remington: Science and Practice of Pharmacy	Joseph P. Remington
11	Theory and Practice of Industrial Pharmacy	Leon Lachman *et al*
12	Drug Discovery and Evaluation (Pharmacological assays)	HG Vogel, electronic publications under ISBN 2006
13	Rutleys Elements of Mineralogy	Frank Rutley, Herbert E. Read
14	Quality and Standards of Medicinal Plants, ICMR publication-2013	
15	Protocol for testing AYUSH drugs – PLIM, Ghaziabad	Ghaziabad
16	Siddha Pharmacopeia of India, Government of india 2011	
17	Siddha Formulary of India, Government of india 2011	
18	Indian Pharmacopeia, Government of india II & III vol 2014	
19	British Pharmacopeia	
20	United States Pharmacopeia	
21	Pharmacopeia Codex	
22	Current Good Manufacturing Practices	
23	Drugs and Cosmetic Act 1940 and Rules 1945 with latest amendments	
24	Drugs and Magic remedies (Objectionable advertisement) Act-1954	
25	Prevention of Food Adulteration (PFA) act	
26	Laws pertaining to Narcotics	
27	Factory and Pharmacy Acts	
28	Consumer Protection Act -1986	
29	Brief information on the peer reviewed journals, official websites and other official search engines along with their links (related with the subject)	

PAPER IV ESSENTIALS IN PHARMACOLOGY

I. GENERAL PHARMACOLOGY

1. Introduction: definition, historical perspective, branches and scope of the subject of pharmacology and its relation with other medical disciplines
2. Nature and sources of Drugs, Drug nomenclature and dosage forms
3. Routes of drugs' administration; advantages and disadvantages of different routes
4. Pharrmacokinetic considerations: drug absorption, distribution, biotransformations and excretion
5. Pharmacokinetic concepts of bioavailability, apparent volume of distribution (aVd), half life (t½), and clearance (CL) that are used to decide the doses and rational dosing during the drug treatment.
6. Pharmacodynamics; site and mechanism of drug action, drug receptors and receptor regulation, concepts of agonists, antagonists, partial agonist and inverse agonist drugs , non receptor mediated drug actions
7. Quantitative aspect of drug action: analysis of dose response curve and therapeutic index (safety index)
8. Factors affecting drug action and doses, how to prolong or shorten the drug action and effects
9. Combined effects of drugs, Drug interactions, food interaction, synergism, concept of pharmacogenomics/-genetics in drug action.
10. Adverse drug reactions (ADRs) and role of pharmacovigilance activity in ADR monitoring

II. EXPERIMENTAL PHARMCOLOGY

Laboratory Animals:

a) Commonly used laboratory, transgenic and other genetically prone animal models (viz., nude mice, SH rats etc).
b) Techniques of blood collection, anesthesia and euthanasia of experimental animals.
c) Various routes of drug administration and techniques
d) Maintenance and breeding of Laboratory animals.
e) Regulations and ethics requirements
f) Instruments used in experimental pharmacology including biochemical/haemtology estimation and histology

Principles Of Biological Standardization

a) Methods of biological assay, principles of biological assays with certain examples.

Organization of screening for the Pharmacological activity of drugs with emphasis on evaluation using in vivo techniques

a) Cardiovascular pharmacology– Anti-hypertensives, anti-arrythmics, vasodilators and diuretics.
b) CNS pharmacology – behavioural and muscle co-ordination, CNS stimulants and depressants, anxiolytics, anti-epileptics and Nootropics.
c) Drugs for neurodegenerative diseases like Parkinsonism, Alzheimers, multiple sclerosis.
d) Respiratory pharmacology – Anti- asthmatics, COPD, Anti- allergic and mucoactives.
e) Reproductive pharmacology – Aphrodisiacs, anti-fertility agents. PCOD, Uterus diseases
f) Analgesics ,anti-inflammatory and antipyretic agents.

g) Gastrointestinal drugs – Anti-ulcer, anti-emetic, anti-diarrhoeal and laxatives.
h) Anti-cancer agents.
i) Drugs for metabolic disorders like anti-diabetic, anti-hyperlipidemic ,antiobesity, and hepatoprotective agents.
j) Urolithiatic agents
k) Drugs used for skin disorders.
l) In-vitro methods for evaluating Siddha formulations
m) Screening antimicrobial activity of Siddha pharmaluations

Toxicity studies:
Introduction to different guidelines, Different Acute, sub acute, sub chronic, chronic toxicity studies, carcinogenicity, mutagenicity and teratogenicity studies according to regulatory guidelines

Biostatstics used in experimental and Toxicological studies

III CLINICAL PHARMACOLOGY:

- Drug development process
- Various GCP guidelines
- Different study design used in clinical studies (case control, co-hort, RCT)
- Systematic review and meta-analysis

IV SYSTEMIC PHARMACOLOGY:

A. Drugs affecting autonomic nervous system (ANS)

Brief knowledge of anatomy and physiology of ANS, receptors, various sites of adrenergic and cholinergic neurotransmission affected by drugs, classification of sympathomimetics (adrenergic agonists), sympatholytics(adrenergic antagonists) and their actions on various systems, therapeutic uses, adverse effects, important contraindications, therapeutic classification of adrenergic agonists.
Classification of parasympathomimitics (cholinergics) and (parasympatholytics (anticholinergics) and their actions on various systems, therapeutic uses, adverse effects, important contraindications.
Mechanism of action and adverse effects of Skeletal muscle relaxants.

B. Local anesthetics (LAs)

Classification of local anesthetic agents based on duration of action, mechanism of action, effect of pH on Las, combination of adrenaline with lignocaine, adverse effects of Las, techniques of LA.

C. Drugs affecting renal system

Brief knowledge of physiology of renal system
Classification of diuretics and antidiuretics based on their site of action and their mechanism of action, therapeutic uses, adverse effects, drug interactions, contraindications.
Vasopressin analogues and their uses.

D. Drugs acting on cardiovascular system (CVS)

Brief knowledge of physiology of cardiovascular system
Classification of drugs, mechanism of action and important therapeutic uses, adverse effects, drug interactions and contraindications of the following groups.

- Antihypertensive agents
- Antiarrhythmic agents
- Anti-anginal agents
- congestive heart failure (CHF)
- myocardial infarction (MI)
- peripheral vascular disease (PVD)

E. Autacoids

Brief knowledge of physiology of autacoid substances and process of inflammation
Classification of drugs, mechanism of action and important therapeutic uses, adverse effects, drug interactions and contraindications of the following groups.
NSAIDs
Opioid analgesics
Antihistaminics

F. Drugs acting on gastrointestinal system

Brief knowledge of physiology of gastrointestinal system
Classification of drugs, mechanism of action and important therapeutic uses, adverse effects, drug interactions and contraindications of the following;
Antiemetics
Peptic ulcer

G. Drugs acting on respiratory system

Brief knowledge of physiology of respiratory system
Classification of drugs, mechanism of action and important therapeutic uses, adverse effects, drug interactions and contraindications of the following groups.
Expectorant and mucolytics
Drug used in Asthma

H. Drugs affecting blood and its components

Brief knowledge of physiology of blood
Classification of drugs, mechanism of action and important therapeutic uses, adverse effects, drug interactions and contraindications of the following groups.
Haematinics
Antiplatelet agents
Fibrinolytics and antifibrinolytics
Coagulants and local haemostatis (styptics)
Anticoagulants
Hypolipidemics

I. Drugs acting on central nervous system (CNS)

Brief knowledge of anatomy of brain, functional areas of brain, neurotransmitters and receptors involved

Classification of drugs, mechanism of action and important therapeutic uses, adverse effects, drug interactions and contraindications of the following groups.
Anxiolytics and hypnotics
Antiepileptic drugs
Antipsychotic drugs
Antidepressants
Antimanic drugs
Drug therapy of neurodegenerative disorders

J. Hormones and their antagonists

Brief knowledge of physiology of the anterior pituitary hormones
Growth hormone, gonadotropins, gonadotropin releasing hormones(GnRH).
Classification of hormonal agonists and antagonists, mechanism of action, pharmacological actions, therapeutic uses and adverse effects of the following
Growth hormone preparations and release inhibitors
Gonadotropins
GnRH agonists
Thyroid and antithyroid agents
Insulin and other antidiabetic drugs
Adrenocortical steroids and their analogues
Estrogens, progestins, androgens
Hormonal contraception
drugs for erectile dysfunction
drugs affecting calcium balance
drugs affecting uterus function

K. Antimicrobial agents

Brief about the following:

Classification of microbes and brief knowledge of their characteristic features pertaining to chemotherapy
Adverse effects of Commonly used antibiotic in clinical practice
Brief about the following:
Antitubercular drugs
Antileprotic drugs
Antifungal agents
Antiviral drugs
Antimalarial drugs
Antiamoebic drugs
Anthelmintics

L. Cancer chemotherapy

Brief knowledge of cell cycle
Classification, mechanism of action, adverse effects

M. Immunopharmacology

Brief knowledge about physiology of immune system, immune deficiency and hyperimmune conditions.
Immunostimulants, immune suppressants and their therapeutic uses and adverse effects.

Miscellaneous topics
List the Chelating agents
List the Antiseptics and disinfectants
Vitamins, minerals
List the Drugs acting on skin and mucous membrane (including psoriasis, acne, scabies etc)

PRACTICALS:

Experimental Pharmacology:

Handling of animals, collection of blood and urine samples.
Assembly of organ bath and setting of thermostat.
Isolated tissue preparations:
To prepare log dose response curve of a suitable drug on:

- Guinea pig ileum.
- Guinea pig tracheal chain
- Guinea pig vas deferens
- Frog rectus abdominis
- Rabbit atrium
- Rat colon
- Rat uterus
- Rat gastric fundus
- Rat anococcygeus muscle

To perform four-point bioassay of a suitable drug on:

- Guinea pig ileum
- Guinea pig vas deferens
- Rat colon
- Rat uterus
- Rat gastric fundus
- Frog rectus abdominis

Determination of ED50 of histamine on guinea pig ileum.

Determination of ED50 of acetylcholine on frog rectus abdominis muscle.

Determination of pD2 values of histamine on guinea pig ileum.

Determination of pD2 value of acetylcholine on frog rectus abdominis muscle.

Determination of pA2 value of acetylcholine on guinea pig ileum.

To study the stimulatory and depressant effects of drugs on Blood Pressure ofrat.

Screening Tests on animals to study the following activities:

- Motor in-coordination
- Anxiolytic effect
-Despair behavior

-Anticonvulsant effect
-Diuretic activity
-Spontaneous motor activity
- Analgesic effect
- Conditioned Avoidance Response
-Antipsychotic effect
-Anti-inflammatory effect

Statistics:

- Use of calculators and electronic spread sheets for understanding of: Elements of data collection and presentation of data
- Measures of central tendency and dispersion
- Non parametric tests
- Parametric tests (including ANOVA)
- Correlation and regression

References:

S. no	Name of the Reference Book/publications/year	Author
1.	Goodman & Gilman's The Pharmacological Basis of Therapeutics	Goodman and Gilman
2.	Pharmacology and Pharmacotherapeutics	Satoskar Bhandarkar & Ainapure
3.	Basic and Clinical Pharmacology	BG Katzung
4.	Pharmacology: prep. manual for medical graduates	Dr.Tara shanbhag
5.	"Essentials of Pharmacology"	Crossland, J.and Thomson, J.H., Harper and Row
6.	Applied Therapeutics	Kimble, Young, Corelli and Alldredge
7.	Clinical Pharmacology,Jaypee pub 2004	KD Tripathi Jaypee pub 2004
8.	Clinical Pharmacology,2003	Lawrence Benett
9.	Science and Practice of Pharmacy	Remington
10.	Drug Discovery and Evaluation (Pharmacological assays), Electronic publications under ISBN 2006	HG Vogel
11.	The Pharmaceutical codex principles and practice of pharmaceutics, Publication; London: The Pharmaceutical Press	Walter Lund,
12.	Indian Pharmacopeia	
13.	British Pharmacopeia	
14.	United States Pharmacopeia	

DISSERTATION

Kindly refer the regulation 11 of IMCC (Post-Graduate Siddha Education regulations, 2016.