MASTER OF PHARMACY (AYURVEDA)
M. PHARM. (AYU.)

Details of Course Content

First Year:

Paper-I Subject: Dravyaguna Vigyan-I
First Year

Time: 3 hours- Theory
3 hours – Practical

Theory: 100 Marks
Practicals: 100 Marks

1. Characteristics of Dravyaguna Shastra, Sapta Padarthas, General information regarding Rasa, Guna, Virya, Vipaka, Prabhava & Karma of Dravyas.
2. Characteristics of Dravya, its importance, Panchabhautik composition, Aushadhatva, reasons for superiority of Dravyas.
3. Classification of Drugs according to Ayurvedic Principles.
4. Etymology of Guna, characteristics, types, detailed knowledge with examples of Gurvadi gunas.
5. Etymology, meaning characteristics and number of Rasa, Opinions of different Acharays regarding number of Rasa, Panchabhautiktva of Rasa, its evolution. Difference between Rasa and Anurasa.
6. Etymology and characteristics of Vipaka- Analysis of general principles and opinions of different Acharyas in context of Vipaka. Properties and functions of Vipaka.
7. Etymology, characteristics and nature of Virya. Analysis of general principles and opinions of different Acharyas in context of Virya, Number, properties and functions of Virya.
8. Etymology of Prabhava, characteristics, functions with examples.
9. Etymology of Karma, characteristic, nature, types and modality of Karma from ancient and modern perspectives. Detail discussion with examples of the following words denoting Karma, Dipana, Pachana, Stambhana, Sramshana, Anulomana, Bhedana, Rechana, Lekhana, Grahi, Madkari,, Samshodhana, Vyavayi, Vikasi, Pramathi.
10. Botanical classification of drugs according to the shape, properties, actions, class, important effects, similarities etc. Study of Dashamula, various Panchamula, Panchavalkala, Panchapallava, Triphala, Trikatu, Trimada, Vallipanchamul, Trinapanchamula, Madhyampanchamula, Kantakpanchamula, Panchakshirivriksha, Jivanpanchamula, Panchatikta, Panchakola, Shadushana, Trijata, Chaturjata, Chaturbija, Madhuratraya, Amlapanchaka, Trikarshika Maha Panchavisha and Upavisha.
11. Drugs of mineral origin, Lavanapanchaka, Kshardwaya, Kshirastaka.
12. Knowledge of the properties and action of the drugs of the following classes:

Jala varga	Dugdha varga	Madhura varga
Ikshu vara	Lavan varga	Shamidhanya varga
Shuka dhanya varga	Aharopayogi varga	

13. The knowledge of the identification and study of the following drugs:

Guduchi	Manjistha	Kutaja
Dhattura	Vasa	Pippali
Arjuna	Anantamoola	Aswagandha
Satavari		

14. The knowledge of following drugs regarding classification, Latin name, Family, Synonyms, Botanical Description, Varieties, Habitat, Chemical composition, Rasapanchaka (properties), Doshakarma, Uses, part used, Dosage, Formulation, Substitute and Adulterants:

1. Aragvadha	2. Arjuna	3. Agnimantha
4. Aamalaki	1. Aswagandha	6. Aswattha
7. Arka	8. Apamarga	9. Ardraka
10. Ashoka	11. Arishtaka	12. Bilva
13. Bala	14. Brahmi	15. Bhringaraja
16. Brihati	17. Bhallataka	18. Bhumyamalaki
19. Bakuchi	20. Chitraka	21. Chandana
22. Champaka	23. Dhattura	24. Dhataki
25. Durva	26. Dhanyaka	27. Draksha
28. Ela	29. Eranda	30. Gudhchi
31. Guggulu	32. Gokshura	33. Gunja
34. Goraksha Ganja	35. Haritaki	36. Haridra
37. Hingu	38. Irimeda	39. Karvira
40. Kapikachchu	41. Khadira	42. Kumari
43. Kutaja	44. Katuka	45. Kantkari
46. Karanja	47. Kalmegha	48. Khatmi
49. Kirata tikta	49. Kanchanar	50. Karkatshringi
51. Karpoora	52. Lodhra	53. Lavanga
54. Latakaranja	55. Mandukparni	56. Maricha
57. Majuphala	58. Mustaka	59. Madhuyashti
60. Meshashringi	61. Madhuk	62. Methika
63. Nirgundi	64. Nimba	65. Narikela
66. Parisha	67. Patha	68. Pippali
69. Plaksha	70. Punarnava	71. Prishniparni
72. Patala	73. Pushkarmula	74. Parpata
75. Rohitaka	76. Rasna	77. Sariva
78. Shyonaka	79. Shatavari	80. Sharapunkha
81. Shunthi	82. Sarpagandha	83. Sudarshana
84. Shalmali	85. Shankhapushpi	86. Tulsi
87. Trivrit	88. Twak	89. Talisapatra
90. Udumbara	91. Vasa	92. Vata
93. Vacha	94. Vibhitaki	95. Yavani

PRACTICALS:

1. Preparation of Herbarium sheets of at least 50 drugs from local area and 50 from distant states of country.
2. Method of Identification of drugs.
3. Description and identification of important drugs mentioned in the theory.

Paper- II Subject: Rasa Shastra and Bhaishajya Kalpana – I
First Year

Time: 3 hours – Theory **Theory: 100 Marks**
3 hours – Practical **Practicals: 100 Marks**

Aims and Objectives:

The subject of Rasa Shastra and Bhaishajya Kalpana is considered to be an ancient subject explaining principles and classical methods of preparation of metallic and non-metallic formulations. This is required to be understood more scientifically and has a great potential for research and development in this field. Having obtained Ayurvedic and modern background in the subject during graduation, the students have to take up more difficulty and rare preparations for their studies.

The syllabus includes topics for basic re-orientation and advanced knowledge about different types of preparations.

- Principles and practice of Shodhana, Marana, Jarana, Samskaras, Satva patana. Types of impurities and their removal methods.
- Study of Maharasa, Uparasa and sadharana rasa, groups of drugs, their chemical composition, properties and processing techniques.
- Visha, Upavisha group of drugs, their methods of purification, therapeutic values and uses.
- Study of mercurial preparations like Kajjali, Parpati, Rasasindura, Makaradhvaja, Mallasindoora, Pottli Kalpnana.
- Ratnas and upratnas (Precious and semi precious stones/gems) their processing techniques, properties and uses.
- Study of different putas, their temperature pattern and specific uses.
- Yantras of Rasa Shastra, processing techniques, knowledge of technical terminology used in Rasa Shastra & Bhaishajya Kalpana.
- Sandhana Kalpanas (Asavas & Arishtas), methodology and uses.

PRACTICALS:

1. Preparation of Panchavidh Kashaya Kalpanas, Churna, Vati, Leha, Sneha, Sandhana and Arka (In all atleast 20 preparations).
2. Preparation of Loha, Bhasmas (Swarana, Rajata, Tamra, Lauha, Naga, Vanga, Yashoda, Pittala & Kansya), rasa aushadhis (At least 5 preparations).

Paper – III Subject: Pharmacognostic aspects of Ayurvedic drugs
First Year

Time: 3 hours- Theory **Theory: 100 Marks**
3 hours- Practical **Practicals: 100 marks**

1. The pharmacognostic evaluation of the Ayurvedic vegetable Drugs, their powders and formulations.
2. Chemical constituents, tests, evaluation.

3. Factors affecting the quality of crude drugs.
4. Controversial aspects of Ayurvedic drugs.
5. Studies of Ayurvedic drugs belonging to the following categories (at least five drugs each).
   a) Rasayana drugs.
   b) Antidiabetic drugs.
   c) Antihepatotoxic drugs/Hepatoprotective drugs.
   d) Anticancer drugs.
   e) Anti-inflammatory drugs and
   f) Anti fertility drugs.

PRACTICALS:

1. Plant cell contents starch, calcium oxalate and calcium carbonate crystals.
2. Leaf trichomes and stomata.
3. T.S. of Svarnapatri and microscopical study of its powder.
4. Morphology of leaves- Arka, Nilgiri, Vanapalandu, Tamalapatra and Talispatra.
5. Morphology and T.S. of Tvak.
6. Morphology of Barks- Ashoka and Khadir twak, powder of twak.
7. Morphology and T.S. of Guduchi stem.
8. T.S. and powder of Atasi.
9. Morphology and T.S. of Isbagula. Morphology of Sukshmaila, Chakramarda, Karanja, Jaiphala and Sarsapa.
10. Morphology of fruit drugs- Brihat and Laghu Gokshura, Krishna Jeeraka, Swetajeeraka, Ajamoda, Shatahva, Yavani and T.S. of Mishreya.
11. Morphology study of Umbelliferous fruits- Mishreya, Dhanyaka, Krishna Jeeraka, Sweta jeerak, Ajamoda, Shatahva, Yavani and T.S. of Mishreya.
12. Whole plant drugs- Morphology of Brahmi, Mandukparni, Apamarga and Duralabha.
13. T.S. and powder of Yashtimadhu.
14. Morphology of Manjishtha, Kantakari and T.S. of Shatavari.
15. T.S. of Vacha and Morphology of Jatamansi, Katuki. Varahikanda and Shvetamusli.
16. T.S. powder of Lavanga.
17. T.S. of Shvetachandan and Morphology of Raktachandana, Devadaru, Palasha and Kesara.
18. Study of unorganized drugs- Honey, Gums, Mocharasa, Kumari and Khadira-Niryasa.
19. Morphology of Gall drugs- Karkatashringi, Mayaphala and powder of Karkatashring.

Paper – IV Subject: Quality Control, Standardization techniques and GMP of Ayurvedic Drugs

First Year

Time: 3 hours – Theory
3 hours – Practical

Theory: 100 Marks
Practicals: 100 Marks

THEORY

1. Chromotography: Theory, principles and application.
2. Flame photometry, flourimetry, phosphorimetry, turbidimetry, nephalometry, pH meter, Refractometry.

3. Uv-visible spectroscopy, IR, NMR, MASS spectrometry.
4. Introduction, need, problems and present status of QualityControl. and standardization of Ayurvedic drugs.
5. Quality Control and standardization of Ayurvedic drugs and formulations by employing various physico-chemical, instrumental and chromatographic methods.
6. Good Manufacturing Practices of Ayurvedic drugs.
7. Good Laboratory practices for Ayurvedic Drugs.
8. Study of the important Ayurvedic drugs like Guggulu, Shilajit, Hingul, Rasa Sindura, Haratala, Vanga Bhasma, Naga bhasma, Abhraka bhasma, Lauha bhasma, Praval bhasma, Shukti bhasma, Shankha bhasma with regard to their characteristic, method of preparation and analytical profiles.

PRACTICALS:

Various physico-chemical parameters used in Ayurvedic drug analysis, Analysis of different types of Ayurvedic formulations lie tablets/pills, churna, taila ghrita, avaleha, asava/sristha etc.

Flame photometry, thin layer chromatography, uv-visible spectrophotometry, refractive index, pH, Qualitative test for detecting the presence of different groups of compounds; extraction and estimation of alkaloid. Analysis of Hingula, Rasa, Sindura, Haratala, Tamra bhasma, Shankha bhasma, Lauha bhasma etc.

Paper – V Subject: Pharmacological Aspects of Ayurvedic Drugs
First Year

Time: 3 hours – Theory **Theory: 100 Marks**
3 hours – Practical **Practicals: 100 Marks**

THEORY

1. General principles of drug evaluation, methods of dose fixation – General data on Laboratory animals.
2. Important in vitro in vivo teachniques of drug screening procedures.
3. Pharmacological techniques relevant to Ayurvedic therapeutics like screening for rasayanic (adaptogenic), immunomodulation, etc.
4. Study of Ayurvedic formulations with reference to their mode of action of CNS, GIT, CVS and respiratory systems.

PRACTICALS:

Evaluation techniques for assessing Anti-inflammatory, anti-rheumatic, contraceptive, oestrogenic, anti-oestrogenic, progestogen like activity, anti-gastric and duodenal ulcer activity analgesic, anti-depressant, anticonvulsant, anti-anxiety, memory enhancing, sedative, anti-psychotic, hepatoprotective activities, stress induced changes in blood chemistry and different bio-chemical parameters with liver homogenate. Toxicological evaluation including acute, sub-acute and chronic toxicity studies.

Paper VI Subject: Pharmaceutical Technology
First Year

Time: 3 hours – Theory **Theory: 100 Marks**
3 hours – Practical **Practicals: 100 Marks**

THEORY

1. Various aspects of different pharmaceutical formulation.
2. Preformulation studies, considerations of powder and liquid, drug materials, their characteristics & production considerations.
3. Bioavailability in drug development including bioequivalence studies.
4. Compartment modeling.
5. Rate constants for absorption & elimination and different half lives.
6. Volume of distribution, clearance & their significance.
7. Therapeutic drug monitoring.
8. Sustained & controlled release principles, dose considerations, physicochemical & biological properties of drugs relevant to S.R. formulations, Regulatory affairs concerned with S.R. products, Assay & biopharmaceutical evaluation protocol.
9. Oral CDDS Osmotic, membrane permeation, enteric controlled, ion exchange controlled, hydrogels, multi-laminated systems, matrix systems, diffusion and dissolution controlled systems.
10. Drug Regulatory Affairs & Intellectual Property rights.

PRACTICALS: According to above syllabus.

SECOND YEAR:

Paper – I Subject: Dravyaguna Vigyana-II
Second Year

Time : 3 hours – Theory **Theory: 100 Marks**

THEORY

1. Identification of medicinal herbs with their parts used along with their main pharmacological properties and uses.
2. Classification and identification of drugs.
3. Need of Research and applicability of dravyaguna in modern era.
4. Description and determination of main actions/Karmas.
5. Knowledge of the properties, effect and uses of following drugs of animal origin.
   Kasturi, Gorochana, Pravala, Mukta, Shankha, Shambooka, Varatica, Shukti, Mrigashringa.
6. Characteristic functions of Samanyapratyarabdha and Vichitrapratyarabdha.
7. Various impurities of Drugs, method of purification of drugs.

8. The collection of Drugs and the characteristics of collected drugs, knowledge of method of collection, Knowledge of the time for collection. Preservation of collected drugs by dry and wet method.
9. Knowledge of following drugs regarding the classification, Latin name, Family, Vernacular name, Synonyms, Botanical description, Varieties, Habitat, Chemical, composition, Rasapanchaka, doshakarma, Actions, Uses, Part used, dosage, Formulation, Substitute, Adulterants etc.

1. Akarkara	2. Aswagola	3. Aralu
4. Amalvetasa	5. Ahiphena	6. Aamra
7. Asmantaka	8. Avartaki	9. Avartani
10. Apamarga	11. Babula	12. Bijaka
13. Bhanga	14. Bharangi	15. Changeri
16. Chakramarda	17. Chandrashura	18. Chavya
19. Dhanwayasa	20. Dugdhapheni	21. Erandakarkati
22. Gandhaprasarini	23. Gojihwa	24. Hritpatri
25. Danti	26. Hrinsa	27. Hansaraja
28. Ingudi	29. Ishwari	30. Karvellaka
31. Kumkuma	32. Katphala	33. Karpasa
34. Karmarda	35. Kakodumbara	36. Kadamba
37. Kadali	38. Kamkustha	39. Kumuda
40. Kasthadaru	41. Kajutaka	42. Khatmi
43. Kokilaksha	44. Latakaranja	45. Langali
46. Lajjalu	47. Mishreya	48. Mamajjaka
49. Murva	50. Makhanna	51. Mudgaparni
52. Mashaparni	53. Nimbuka	54. Nili
55. Nala	56. Nadihingu	57. Nagkeshara
58. Priyangu	59. Parnabija	60. Palandu
61. Puga	62. Putiha	63. Putrajivaka
64. Punnaga	65. Rasna	66. Rudraksha
67. Rumimastagi	68. Shigru	69. Shringataka
70. Snuhi	71. Shallaki	72. Swarnakshiri
73. Sahachara	74. Shala	75. Shatapushpi
76. Talamuli	77. Shati	78. Saptaparna
79. Surana	80. Suranjana	81. Surapunnaga
82. Tila	83. Tagara	84. Taruni
85. Trayamana	86. Tuvaraka	87. Ushira
88. Vikankata	89. Uttangana	90. Vidanga
91. Varahikanda	92. Vridhadaru	93. Vanpalandu
94. Yavasa	95. Vatshnabha	96. Kulattha
97. Chukra	98. Kitmari	99. Mankanda
100. Soma		

Paper – II Subject: Rasa Shastra and Bhaishajya Kalpana- II
Second Year

Time: 3 hours – Theory **Theory: 100 Marks**

- Study of Sudhavarga drugs (calcium group of preparations) their processing techniques, properties and uses.
- Dhriti Kalpana (Gandhak dhruti), preparation, properties and uses.
- Study of Loha preparations, preparation techniques, properties and uses.
- Arka preparations, methods and uses.
- Ksharas and Lavanas, preparations and uses.
- Malhar, Varti preparation & uses.
- Sneha Kalpanas (Taila and Ghrita) preparation and uses.

Paper – III Subject: Advanced Pharmaceutical Chemistry of Ayurvedic Drug
Second Year

Time: 3 hours- Theory **Theory: 100 Marks**
3 hours- Practical **Practicals: 100 Marks**

THEORY

1. General method of Isolation and separation of plant constituent.
2. Qualitative reactions employed for the detection of plant constituents.
3. Application of T.L.C., Column chromatography, G.L.C., H.P.L.C. and H.P.T.L.Analysis of plant constituent.
4. Determination of organic structures through Interpretation of I.R., H^1 N.M.R., C^{13} N.M.R., Mass spectroscopy.
5. Stereochemistry of Phytomolecules.
6. Mechanism of organic reactions.
7. Important named reactions related to phytomoleculer.
8. Biostandardisation and related statistics – probability, t-test, F-test, Chi-square test, Regression and co-relation.

PRACTICALS: According to above syllabus.

Dissertation

Second Year

Dissertation (Evaluation): 100 Marks
Open Defense: 100 Marks

In the First year itself the candidates may be given their subject for specialization. The concerned guide may finalise the topic for their dissertation at the end of the first year. The students will work in the second year for their dissertation under guidance of their guide. If the work is related to two departments then the candidate shall complete the work related to the other department under the supervision of the concerned theacher who will be the co-guide for that dissertation. At the end of the year before the examination the candidate will have to submit his dissertation. The examiner for the practical examination and for evaluation of the dissertation may be the same. The guide should be one of the examiners for the practical examination and for evaluation of the dissertation.

Dissertation may be prepared in any one of the following subjects:

1. Ayurvedic Pharmaceutics (Rasashastra and Bhaishjya Kalpana).
2. Ayurvedic Plant Sciences (Dravyaguna Vigyan).
3. Pharmacognosy & Phytochemistry of Ayurvedic Drugs.
4. Pharmaceutical Analysis & Standardization of Ayurvedic Drugs.
5. Pharmacology & Toxicology of Ayurvedic Drugs.
6. Pharmaceutical Technology