PROSPECTUS OF THE B. PHARMA. (AYURVEDA)

ABOUT FACULTY

In the year 1920, a section of Ayurveda was established in BHU under Faculty of Oriental Learning and Theology. In 1927, the College of Ayurveda was established in Banaras Hindu University as an independent body in which, a six years A.M.S. (Ayurvedacharya with Medicine and Surgery) course was started. The college was attached with 100 bedded S. S. Hospital and graduates of Ayurveda started getting practical training in this hospital. In the A.M.S. course, there was a provision of teaching Science as well as almost all the disciplines of Modern medicine. This attempt was a unique attempt to utilize the best of both the systems. In 1951, the University re-named the A.M.S. degree as A.B.M.S. (Ayurvedacharya Bachelor of Medicine and Surgery) by incorporating further modern disciplines. In 1959, then existing undergraduate course in Ayurveda was suspended to provide more emphasis on Post Graduate education and therefore, in 1960, the Post Graduate Institute of Ayurveda was established. This was merged into the newly established Institute of Medical Sciences in 1971.

Banaras Hindu University is the only University in India, which has a full-fledged constituent Faculty of Ayurveda on its Campus. The Faculty of Ayurveda is the integral part of the Institute of Medical Sciences where both the Faculties i.e., Faculty of Medicine and Faculty of Ayurveda function under one roof and common administrative control. This unique and singular situation provides ample opportunity of academic interaction between the two faculties with interdisciplinary research, education and patients' care, which is essential for growth of medical science in general and scientific development of Ayurveda in particular.

In 1999 the under graduate course in Ayurveda was re-started. This is of 4 1/2 years duration followed by compulsory internship of one year as per the recommendation of Central Council of Indian medicine leading to B.A.M.S. degree. Presently this Faculty consists of 8 academic departments and 15 divisions. Fifty students are admitted every year in B.A.M.S. Course with an all India level competitive test. The Institution has facility for admission of 50 students in different Postgraduate courses for M.D. (Ay.)/M.S. (Ay.) degrees per year in as many as 15 specialty subjects which is the largest number for any one single institution in the country.

It also conducts special Self Financing Postgraduate Diploma Courses in Panchakarma Therapy and Drug Standardization open to all graduates of Ayurveda.

In addition, a number of scholars are also enrolled for Ph.D. degree in various disciplines.

DETAILS OF THE B. PHARMA (AY) COURSE

1. **Title of the Course**: Bachelor of Pharmacy (Ayurveda)
2. **Course Conducting Faculty:**

   Faculty of Ayurveda, Institute of Medical Sciences,

   Banaras Hindu University at South Campus, Barkachha, Mirzapur.
3. **Course Co-coordinator:** The Dean, Faculty of Ayurveda
4. **Duration of the course:** Four Years
5. **The course is applicable for**

   Students passing out of:

   10 + 2 or equivalent with Science subjects (PCB) Age Limit: Minimum 17 Years (on Ist July every year
6. **Number of students considered for admission by entrance test:**

   30 students with minimum of 3 female candidates
7. **Aim and Objective of the course:**

To meet the demand of skilled experts with sound knowledge of Ayurvedic principles and capable of producing standard and cost-effective Ayurvedic Medicines

8. **Level of Course:** Bachelor Degree
9. **Justification of the course:**

At present, there are ten thousand pharmaceutical units producing Ayurvedic medicines in India. These are meeting the domestic and global requirements. The estimated market of these products is about four thousand crore rupees per year. The proposed course is expected to produce individuals with abilities to identify, collect and process the materials required for the production of standard and efficacious drugs. The graduates will be capable of incorporating modern advanced technology in the manufacturing process. They will also be conversant with modern drug manufacturing techniques.

First Year

S.No	Subject	Theory Marks	Practical Marks
1	Rasa Shastra and Bhaishajya Kalpana – 1	100	100
2	Dravyaguna Vijnana – 1	100	100
3	Ayurveda Sharir Kriya Evam Rachana Vigyana	100	100
4	Pharmaceutical Chemistry (Inorganic and Organic)	100	100
5	Pharmaceutical Biology	100	100
6	Anatomy and Physiology	100	100
7	Sanskrit	50	-
8	Fundamentals of Ayurveda including Swastha vritta	100	-

Second Year

S.No.	Subject	Theory Marks	Practical Marks
1	Rasa Shastra and Bhaishajya Kalpana – II	100	100
2	Dravyaguna Vijnana - II	100	100
3	Dosha, Dhatu, Mala Vijnana	100	
4	Pharmacognosy of Ayurvedic Drugs – I	100	100
5	Pharmaceutical Biochemical Analysis of Ayurvedic Drugs -I	100	100
6	Pharmaceutical Technology of Ayurvedic Drugs - I	100	100
7	Pharmaceutics - Physical Pharmacy	100	100

Third Year

S.No.	Subject	Theory Marks	Practical Marks
1	Rasa Shastra and Bhaishajya Kalpana - III	100	100
2	Dravyaguna Vijnana - III	100	100
3	Pharmacognosy of Ayurvedic Drugs - II	100	100
4	Pharmaceutical Analysis of Ayurvedic Drugs - II	100	100
5	Pharmaceutical Technology for Ayurvedic Drugs –II	100	100
6	Pharameceutical Engineering	100	100
7	Pharmacology & Toxicology of Ayurvedic Drugs –I	100	100

Fourth Year

S.No.	Subject	Theory Marks	Practical Marks
1	Rasa Shastra and Bhaishajya Kalpana-IV	100	100
2	Pharmaceutical Analysis of Ayurvedic Drugs-III	100	100
3	Pharmaceutical technology for Ayurvedic Drugs-III	100	100
4	Pharmaceutical Microbiology	100	100
5	Pharmacology & Toxicology of Ayurvedic Drugs - II	100	100
6	Forensic Pharmacy Acts Rules & Regulations & Pharmaceutical Management	50	-

First Year

Rasa Shastra and Bhaishajya Kalpana – 1

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

2 Hours-Practical **Practicals – 100 Marks**

Aims & Objectives:

Students will be exposed to this important Ayurvedic subject for the first time so they should know the fundamentals, history and development of Rasa Shastra and Bhaishajya Kalpana, the science of preparing classical Ayurvedic metallic and non-metallic preparations.

During the first year they must understand the definition, terminologies, classification and works of pioneer rishis of Rasa Shastra

Section – I (Rasa Shastra – 50 Marks)

- Definition and importance of Rasa Shastra. Difference between Rasa, Rasayana and Rasayan Shastra.
- History of Rasa Shastra – Its development from Vedic era to recent age, development during Samhita period, Samgraha period and modern era. Obstructions in its development. Brief history of Nagarjuna and his works.
- Fundamental principles of Rasa Shastra, Qualities of Rasacharyas and their disciples. Rasa shala according to ancient and modern concepts.
- Terminologies in Rasa Shastra: Dhanvantari Bhag, Rudra Bhag, Lavan Panchaka, Panchamrita, Panchgavya, Dravak gana, Kajjali, Bhavana, Avapa, Nirvapa, Shodhan, Marana, Swedana, Amritikarana, Mardana, Satvapatan, Jarana, Pishti, Kshara, Mutravarga.
- Classification of Rasa drugs.

Yantra

Dola Yantra	Damaru Yantra
Vidyadhar Yantra	Swedan Yantra
Patan Yantra	Baluka Yantra
Bhudhar Yantra	Patala Yantra
Khalva Yantra	Kanduk Yantra

Musa

Vajra	Vajra dravini
Vajra dravana	Varnya
Rupyaa	
Bida	Gara
Vrantaka	Gostani
Malla	Pakva
Gola	Maha
Manduka	Mushal

Detailed study of Puta-its various types, and uses different Kistis, Bhrastis and modern electrical furnaces

Section –II (Bhaishajya Kalpana – 50 Marks)

- Etymology and definitions of Bhaishajya Kalpana and its importance in Ayurveda.
- Brief history and development of Bhaishajya Kalpana.
- Fundamental principles of Bhaishajya Kalpana.
- Mana Paribhasha, different Mana and their comparison with modern matric system,
- Method of collection, storage and preservations of raw drugs.
- General terminologies in Bhaishajya Kalpana

Practical

- Identification of Rasa drugs, their properties and uses.
- Shodhana process for Parada, Gandhaka, Sphatika, Tankana, Gairika, Hingoola, Navasadara, Shankha, Kaparda, Kampillaka.
- Preparation of Swarasa Kalpana, Kalka, Kwatha, Hima, Phanta, Ushnodaka, Tandulodaka, Shadangpaniya, Swargardimanth, Pramathya.

First Year

Subject : Dravyaguna Vijnana – 1

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

2 Hours-Practical **Practicals – 100 Marks**

- Definition of Dravyaguna vijnana and its importance.
- Definition of Dravya, its importance panchabhautic composition and classification .
- Definition of Rasa its types and panchabhautic composition.
- Definition and types of Guna, effect of Guna on Dosha, Dhatu and Mala.
- Definition and types of Vipaka, actions of Vipaka on Dosha, Dhatu and Mala.
- Definition and types of Virya, experimental methodology for study of Virya.
- Definition, and importance of Prabhava.
- Introduction of Mishraka Vargas

  Triphala, Madhuratriphala, Sugandhatriphala, Swalpatriphala, Trijata, Chaturjata, Trikatu, Trimada, Panchakola, Panchapallava, Panchawalkala, Trikantaka, Chaturbhadra, Trikarshika, Laghu Panchamula, Brihat Panchamula, Trinapanchamula, Shadushana, Chaturushana, Kantakapanchamula, Chaturbija, Panchakshirivriksha, Madhyamapanchamula, Jivanapanchamula, Madhuratraya, Amlapanchaka, Mahapanchavisha, Upavisha, Ashtavarga. Panchatikta, Panchapallava.

1. Introduction to some main and common karma (actions)

   Deepana, Pachana, Grahi, Stambhana, Bhedana, Rechana, Anulomana, Sramsaana, Samhsodhana, Rasayana, Vajikarana, Vyavayi, Madakari, Vikasi.

2. Study of following drugs including Classification, Latin name, Family Vernacular name, Synonyms, Botancial description, Varieties, Habitat, Chemical composition, Properties, Doshakarma, Action, Uses, Parts used Dosage, Formulations, Substitute and Adulteration.

1. Aragvadha	25. Kitamari	49. Sarpagandha
2. Apamarga	26. Bramhi	50. Shunthi
3. Arjuna	27. Chitraka	51. Shankhapushpi
4. Ashwagandha	28. Mandukaparni	52. Sudarshana
5. Arka	29. Patha	53. Tulsi
6. Amalaki	30. Patala	54. Trivrit
7. Agnimantha	31. Brihati	55. Udumbara
8. Bala	32. Chandana	56. Vansha
9. Bilva	33. Katuka	57. Vacha
10. Bhringaraja	34. Kantakari	58. Bibhitaki
11. Dhatura	35. Latakaranja	59. Vijayasara
12. Ela	36. Varahikanda	60. Vidanga
13. Gokshura	37. Khadira	61. Yashtimadhu
14. Guduchi	38. Nirgundi	62. Vidari
15. Guggulu	39. Nimba	63. Ashwattha
16. Haritaki	40. Maricha	64. Chandana
17. Haridra	41. Manjishtha	65. Mustaka
18. Jyotishmati	42. Parisha	66. Prishniparni
19. Karavira	43. Punarnava	67. Chukra
20. Kapi kachchu	44. Pippali	68. Choraka
21. Kutaja	45. Rohitaka	69. Dhataki
22. Karanja	46. Sariva	70. Vata
23. Kumari	47. Shirisha	
24. Plaksha	48. Shatavari	

Practicals :

1- Preparation of Herbarium sheets of 25 drugs.

2- Method of Identification of Drugs.

3- Description and identification of important drugs mentioned in the theory.

First Year

Subject : Ayurveda Sharir Kriya Evam Rachana Vigyan

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

Practicals **Practical-100 Marks**

Part – A (Ayurveda Sharir Rachana Vigyan) Marks-50

1. Shariropakrama :- Definition of Sharir and Shaarira, importance and utility of the knowledge of Sharira, (Rachana and Kriya), Shadangatwa of Shaarira, divisions of Sharir.
2. Abhinivritti Sharir :- The constitution of Purusha on the base of Dhatubheda, Pentaelemental structure of sharir, karma purusha, similarity of Loka & Purusha (external world & internal world).
3. Asthi sandhi & Peshi Sharir : - General concept of Asthi and Sandhi sharira, its numbers, types & functions.
4. Koshtha and Ashaya Sharir :- General concept of Koshtha and Ashaya, its definition, number, formation and functioning.
5. Kala and Twak Sharir :- Definition, structure, types and functions.
6. Indriya sharir:- Etymology, number, divisions of Jnanendriya and Karmendriya, general description about its Adhishthana and functions.
7. Garbh Sharir -shukra & artava's qualities qualifying them as pure & competent for conception and Masanumasika vikas of Garbh.
8. Characteristics of presence of Atma in the body.
9. 12 pranas, 10 Pranayatanani, 3- Pradhanmarmani, 15- Koshthangani.

Part-B (Ayurveda Sharir Kriya Vigyan) Marks-50

9. Dosha, dhatu mala moolam shariram.
10. Vata names, location and function in health.
11. Pitta names, location and function in health.
12. Kapha names, location and function in health.
13. Sapta Dhatu, Updhatu and their nutrition from digested food.
14. Description of Hridayam according to Sustrut, its importance and functions in health.
15. Description of Yakrit, its importance and functions according to modern science.
16. Definition, production, types, qualities, importance of Ojas.
17. Definition of Srotas, number, names and importance according to Charak.
18. The process of cognition – Jnamotpatti- according to Charak.

Practicals:

Suitable practicals related to the above topics with the help of Charts, models and soft parts

First Year

Subject : Pharmaceutical Chemistry (Inorganic and Organic)

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

2 Hours-Practical **Practicals – 100 Marks**

Theory : Section – I (Inorganic)

1. Introduction of periodic table and atomic configuration.
2. Occurrence, properties, reactions and important compounds of iron, calcium, aluminium, copper, gold, silver, mercury, lead, arsenic, sulfur, magnesium, zinc, sodium and potassium.
3. Ammonium chloride – preparation, assay and uses.
4. Borax – properties, assay and uses.
5. Reactivity of metal.
6. Different methods for quantitation of heavy metals in Ayurvedic preparation.
7. Titrametric analysis.
8. Gravimetric methods of analysis.

Practicals (Inorganic)

1. Qualitative & quantitative analysis of metal ions presents in Ayurvedic metallic preparations..
2. Different methods of volumetric analysis.
3. Simple gravimetric analysis

Section – II (organic)

1. The concept of resonance and the mechanism of simple organic reactions.
2. Emperical formula, molecular weight determinations, detection of elements, inductive and electrometric effects, hydrogen bonding, atomic and molecular orbitals, valency bond theory, dipole moments.
3. Brief introduction of important aliphatic and aromatic compounds, properties of functional groups, properties, structure & biogenesis of different phytomolecules.
    - Aliphatic hydrocarbons
    - Olefins and acetylenes.
    - Alcohols.
    - Aromatic hydrocarbons.
    - Aliphatic and aromatic halogen compounds.
    - Aliphatic and aromatic ethers.
    - Aliphatic and aromatic aldehydes and ketones.
    - Aromatic alcohols.
    - Aliphatic and aromatic acids.

1. Stereochemistry :- Elements of symmetry, optical and geometrical isomerism, optical activity, conventions used in stereochemistry, enantiomerism, recemic modifications, configurations.
2. Brief introduction to macro molecules.

Organic Practicals : (organic)

1. Physical parameters like solubility, melting point, boiling point.
2. Elemental analysis.
3. Tests for determination of functional groups.
4. Analysis of compounds like Camphor, menthol, thymol, vanillin, ascorbic acid, honey.
5. Standardization of Ayurvedic products

Books Recommended

1. Organic Chemistry - Morrison and Boyd.
2. Organic Chemistry - I.L. Finar.
3. Organic Chemistry - O.P. Agarwal.

First Year

Subject : Pharmaceutical Biology

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

2 Hours-Practical **Practicals- 100 Marks**

THEORY

A. (Botany)

1. Structure of typical plant cell and its important inclusions. Structure and functions of some important plant tissues like parenchyma, sclerenchyma, xylem, phloem etc.
2. General morphology of plants with special reference to flowers and fruits.
3. Principles of classification of plants with special reference to the plants of the following families. Studies of the diagnostic characteristics, with emphasis on plants of medicinal and economic values. Preparation and preservation of Herbarium sheets.

   (1) Ranunculaceae, (2) Menispermaceae, (3) Cruciferae, (4) Capparidaceae, (5) Malvaceae, (6) Rutaceae, (7) Leguminosae, (8) Papilionaceae, (9) Caeslpiniaceae, (10) Mimosaceae, (11) Umbelliferae, (12) Apocynaceae, (13) Solanaceae, (14) Convolvulanceae, (15) Euphorbiaceae, (16) Liliaceae, (17) Zingiberaceae.
4. Introduction, histological background of some medicinal plants. Definition of the crude, organized and unorganized drugs.
5. Classification of the crude drugs.
6. Methods of systematic studies of the crude drugs.
7. Cultivation, collection and storage of crude drugs.

B. (Zoology)

Disease causing parasites of protozoa and metazoa.

1. Protozoa – Brief Morphology & Lifecycle/Habitate/Distribution.
   a. Malarial parasites.
   b. Leishmania.
   c. Trypanasoma.
   d. Entamoeba and Giardia.
   e. Pneumocystis carini.
2. Nematodes:
   (a) Enterobius (b) Trichuris
   (c) Ancylostoma (d) Strongyloides
   (e) Ascaris.
3. Filaria :-
   (a) Lymphatic (b) Onchocerca
   (c) Loa loa.
4. Miscellaneous :
   Dracunculus (Guinea worm)

Practical:

1. Morphology of flowers and fruits.
2. Morphological identification of Medicinal Plants belonging to families underlines and mentioned in the theory.
3. Plant tissues like Parenchyma, collenchyma, sclerenchyma, xylem, phloem etc.
4. Cell contents like starch grains, calcium oxalate, calcium carbonate crystals.
5. Epidermal structure of leaf with special reference to stomata and trichomes.
6. Anatomy of dicot and monocot stem, root and leaf.

First Year

Subject : Anatomy, Physiology

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

2 Hours-Practical **Practicals – 100 Marks**

THEORY

Note-Introductory knowledge of Anatomy, Physiology Of the followings:

1. Scope of Anatomy and Physiology.
2. Terminology of Anatomy
3. Elementary cell and tissues of the Body – Epithelial Tissues, Muscular Tissue, Nervous Tissue.
4. Skeletal System.

5. Skeletal muscles of the body.
6. Central Nervous system.
7. Blood-Composition of blood functions of blood elements, blood group and coagulation of blood. Brief information regarding disorders of blood.
8. Lymphatic system
9. Cardiovascular system
10. Digestive system
11. Endocrine glands
12. Respiratory system
13. Special sense – Taste, Smell, hearing and equilibrium, Sight, Touch, Pain.
14. Urinary System
15. Reproductive system – Female Reproductive system, Male Reproductive system.
16. Concept of health.
17. Nutrition and Health.

Practicals: Practicals:Suitable practicals related to the above topics with the help of Charts, modals and soft parts

First Year
Subject : Sanskrit

Time : 3 Hours – Theory **Theory – 50 Marks**

1- Grammar

A. 1. Forms of *Rama* and *Vana* (Masculine Gender and Neutral Gender). and *parasmaipadi* verbal routes and verbs in present tense.
2. Study of seven cases (*Karaka*)
3. Forms of Hari in masculine gender and parasmaipadi verbs in future tense.
4. Bhanu in masculine gender and past tense.
5. Nethru in masculine gender and imperative mode.
6. Verb "Go" and potential mode.

B. 1. Latha, Dhanu and Mathi in feminine gender and atmanepadi verbs of first punctuation.
2. Verbs of forth a sixth conjugation.
3. Vari, Madhu words in neutral gender and verbs of tenth conjugation.
4. '*Avyaya'* words and verbs of second conjugatin.

C. Pronouns and Numeric.

D. Consonant ending words and fifth and eight conjugation.

2**. Sanskrit Literature:**

- Prose and poetry from two stories of '*Hithopadesha*'.
- Maheshwar Sutram, Swara & Vyanjana knowledge.
- Swara sandhi, Vyanjana sandhi & Visarga Sandhi.

First Year

Subject: Fundamentals of Ayurveda Including Swasthavritta

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

Part-A (Fundamentals of Ayurveda) 50 Marks

1. Definition aims and contents of Ayurveda.
2. Theory of evolution according to Ayurveda.
3. Ten points for examination i.e. Kaarana, Karana, Karya, Karyayoni, Karya phala, Anubandha, Desha, Kala, Prakriti and Upaya and their utility and applications in Pharmacy .
4. Definition and types of Shad Padartha
5. Concepts of Pramana for examination

Part-B (Swasthavritta) 50 Marks

6. Definition and importance of Swasthya,
7. Dinacharya and ratricharya.
8. Ritucharya.
9. Importance of ahar, nidra and brahmacharya.
10. Importance of shuddh vayu,jala,desha and kala.

Second Year

Subject : Rasa Shastra and Bhaishajya Kalpana – 1

Time : 3 Hours – Theory **Theory – 100 Marks**
2 Hours-Practical **Practicals – 100 Marks**

Section – I (Rasa Shastra – 50 Marks)

Parada Vignaniyam

Parada – Its synonyms, Etymology, brief history, its origin, sources of Parada; physical & chemical their nature, Grahya-Agrahya Parada, Dosas of Parada; its effects on human body; shodhana, Hingulottha parada; Asta Samskara of Parada. Murchana of Parada & Rasa-Bandha, Parada Gati.

Study of Mercurial Formulations

Kajjali (Ardhaguna, Samaguna, Dwiguna) Parpati Kalpana, Kupipakva Rasayana Kalpana, Pottali Kalpana, Kharaliya Kalpana.

Concept of Shodhana, Marana & Sattvapatan.

Study of Bhasma – Sindura Kalpa.

Section – II (Bhaishajya Kalpana – 50 Marks)

Panca- Vidha Kashaya Kalpana –difinition, their method of preparation dosage & uses. Importance of Panca Vidha Kashayas Kalapan.

Brief introduction, definition, preparatory method, dosage and therapeutic indications of the following Kalpas:-

Sadang Paniya, Usnodaka, Tandulodaka, Laksha rasa, Mamsa Rasa, Mantha, Aushadha Siddha Paniya, Aushadha Siddha Yusa, Arka, Panaka, Sharkara, Pramathya, Rasakriya, Phanita, Avaleha, Ghanasattva, Guda Pakwa, Churna, Gutika-vatika, Modaka, Varti, Guggulu Kalpa, Lavana Kalpana, Masikalpa, Ayaskriti, Kshara-Sutra preparation, Kshara Kalpana.

Practicals

1. Preparation of mercurial drugs : Kajjali, Rasa Parpati, Panchamrita parpati, Rasa Sindoora, Hingoolatha Parad, Ashta Samskaras of Parad.
2. Preparation of Tribhuvan, Kirti Rasa, Laxmivilas Rasa, Abragarbha pottali, Kanjinirman, Guduchi satva.
3. Preparation of Shankha Bhasma, Praval pisti, Praval bhasma, Hingvastaka churna, hatpushpaka, Gulab arka.

Second Year
Subject : Dravyaguna Vijnana - II

Time : 3 Hours – Theory **Theory – 100 Marks**
2 Hours-Practical **Practicals – 100 Marks**

Theory

- A Brief History of Dravya guna Shastra.
- Concept of Rasa, Guna, Virya ,Vipaka and Prabhava.
- The basis of nomenclature and Synonyms of Drugs.
- Discussion regarding the period and author of following nighantus.

Dhanwantarinighantu, Madanpalaniganthu, Rajanighantu, Kaiyadeva nighantu, Bhavaprakashanighantu.

- Various impurities of drugs and methods of purification of drugs.
- Knowledge of therapeutic and actions of the following vargas.

(1) Jalavarga (2) Dugdhavarga (3) Madhurvarga (4) Lavanavarga (5) Taila varga (6) Madya varga (7) Ikshu varga (8) Lavanavarga (9) Mutra varga (10) Aharopayogivarga.

Study of following drugs including Classification, Latin name, Family, Synonyms, Botanical description, Varieties. Habitat, Chemical composition, Properties, Action and uses, Parts used, Dosage, Formulation, Substitute and Adulterants.

1. Arka	27. Karkatashringi	53. Puga
2. Ardraka	28. Kumkuma	54. Putrajeevaka
3. Akshota	29. Kalamegha	55. Punnaga
4. Asthishrimkhala	30. Kiratatikta	56. Rudanti

5. Ashwagola	31. Kanchanara	57. Rudraksha
6. Aparajita	32. Katphala	58. Saptaparna
7. Arishtaka	33. Kusha	59. Shalmali
8. Akarakara	34. Karavira	60. Shigru
9. Bakuchi	35. Karamarda	61. Sharapunkha
10. Bhumyamalaki	36. Kakodumbara	62. Sleshmataka
11. Bimbi	37. Udumbara	63. Snuhi
12. Bhallataka	38. Lavanga	64. Shringataka
13. Banafsha	39. Methika	65. Tuvaraka
14. Changeri	40. Madhuka	66. Twak
15. Chakramarda	41. Meshashringi	67. Talishapatra
16. Danti	42. Mamajjaka	68. Talamuli
17. Draksha	43. Mishreya	69. Ushira
18. Dhanyaka	44. Musali	70. Vrihadaila
19. Durva	45. Narikela	71. Varuna
20. Eranda	46. Nimbuka	72. Vanapalandu
21. Gunja	47. Puskarmula	73. Patalagarudi
22. Irimeda	48. Priyangu	74. Vikankata
23. Kupilu	49. Palasha	75. Yavani
24. Karpasa	50. Parijata	76. Yavasa
25. Karavellaka	51. Parnabija	
	52. Palandu	

Practicals :

Preparation of Herbarium sheets of 50 drugs.

Method of Identification drugs.

Description and identification of important drugs mentioned in the theory.

Second Year
Subject : Dosha, Dhatu, Mala Vigyan

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

Part-A

1. Dosha, Dhatu Mala Mulam Hi Shariram – main components of the body. Definition of life 'Jeevitam'. Tristhuna Ayurveda, Importance of equilibrium of Dosha, Dhatu mala in health. Panchabhautic aspects of Dosha, Dhatu and Mala. Vriddhi & Kshaya of Dosha, Dhatu and Mala .
2. Definition of Dosha, their types, Dravyatva and Importance of doshas,their definition, etymology, synonyms,.functions & their specific functions with locations.

Part-B

3. Knowledge about 'Srotas', the types, the signs of their disturbance. Manovahasrotas its seat. Relation of Manas with Indriya and with Shiras. Knowledge about Nidra, Buddhi, Dhruti, Mati, Prajan, Medha. Types of Nidra.
4. Deha and Manas Prakriti,their types and clinical importance.

Second Year

Subject : Pharmacognosy of Ayurvedic Drugs - I

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

2 Hours-Practical **Practicals – 100 Marks**

1. Definition; History, Classification and Systematic study of Crude drugs. Cultivation, Collection, Storage, Extraction and Isolation of active constituentes of crude drugs.

II. Drugs containing Carbohydrates -

Starch - Maize, Amrita Satwa, Honey. Gums - Babul niryas, Shalmali niryas.

Mucliages - Isabgola, Brihat gokshura, Bilvaphal, Svetamusli.

III. Drugs containing Glycosides.

Anthraquinones - *Svarnapatri,* Kumari, Manjishta, Aragvadha, Chakramarda. Cardiac - Karavira, Arka, Vanapalandu, Digitalis.

Saponins - *Yashtimadhu,* Brahmi, Mandukparni, Varahikand, Laghugokshura, Apamarga, Arishtaka, Shikakai, Kantakari, Duralabha, Ingudi, Shatavari, Kakmachi. Cyanogenetic - *Atasi,* Padmakashta.

Flavonoids - *Yashtimadhu,* Bhallataka, Karanja, Kalmegh, Palash.

Coumarians - Bakuchi, Ajamoda.

Bitters - Kiratikta, Katuki, Guduchi.

IV. Drugs containing Volatile Oils -

Umbelliferous fruits - (*Dhanyaka, Misreya,* Krishna jeeraka, Sveta jiraka, Ajamoda, Satahva, Yavani) *Lavanga*, Jaiphal, Twak, Talisapatra, Tamalpatra, Vastuka, Svetachandana, Vacha, Devadaru, Jatamansi. Nilgiri.

V. Drugs containing Tannins

Ashoka Twak, *Arjuna,* Khadir twak, Karkatasringi, Mayaphal, Haritaki, *Bhibhitak*, Amalaki. Khadir niryas.

Practicals :

Morphological study of the selected drugs mentioned in the syllabus. Microscopical study of the drugs which are underlined. Powder study of the drugs mentioned in the Italic.

1. Plant cells contents starch, calcium oxalate and calcium carbonate crystals.
2. Leaf trichomes and stomata.
3. T.S. of Svanapatri and Microscopical study of its powder.
4. Morphology of leaves - Arka, Nilgir; Vanapalandu, Tamalapatra and Talispatra.
5. Morphology and T.S. of Tvak.
6. Morphology of Barks - Ashok 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 Sujsmaila, Chakramardan, Karanja, Jaiphal and Sarsapa.

10. Morphology of fruits drugs - Brihat and Laghu Gokshura, Krishna Jeeraka, Swetajeeraka, Ajomoda, Satahva, Yavani and T.S. of Misreya.
11. Morphology study of Umbelliferous fruits - Misreya, Dhanyaka, Krishna Jeeraka, Sweta jeeraka, Ajomoda, Satahva, Yavani and T.S. of Misreya.
12. Whole plant drugs - Morphology of Brahmi, Madukparni. Apamarga, Durlabha and Kariyatu.
13. T.S. and powder of Yastimadhu.
14. Morphology of Manjishta, Kantakari, and T.S. of Satavar.
15. T.S. of Vacha and Morphology of Jatamansi, Katuki. Varahikand and Svetamusli.
16. T.S. powder of Lavangi
17. T.S. of Svetachandan and Morphology of Raktachandana, Devadaru, Palasha and Kesar.
18. Study of biproduct drugs - Honey, Mocharasa, Kumart and Khadir - Niryas.
19. Morphology of Gall drugs - Karkatasringi, Mayaphal and powder of Karkatasringi.

Second Year

Subject : Pharmaceutical BiochemicalAnalysis of Ayurvedic Drugs - I

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

2 Hours-Practical **Practicals – 100 Marks**

Biochemical analysis

1. Different methods of chromatography.
2. Determination of different physico-chemical parameters like foreign matter, loss on drying, total ash content, acid insoluble ash, extractive values, particle consistency, total solid content, fluorescence analysis.
3. Determination of volatile oil content.
4. Determination of alcohol content.
5. Refractive index and its determination.
6. Analysis of sugar contents.
7. Estimation of oil and fats.
8. Analysis of different Ayurvedic formulations like tablets, pills, asavas, aristhas, avaleha, oils, ghritas, etc.
9. Methods for analysis of raw materials and single Ayurvedic drugs
10. Bioassay of drugs by using animals
11. Methodology to study toxicity of Ayurvedic drugs
12. Concept of microbial contamination in finished and raw material.
13. Concept of heavy metal toxicity .
14. Concept of ethical committee for animal studies and clinical studies
15. General metabolism of macronutrients and micronutrients.
16. Interaction of endocrine glands with energy metabolism.

Practicals :

Animal feeding, biochemical analysis of enzymes in blood and tissues, histological techniques, determination of microbial load in Ayurvedic drugs, assay of hormones, ELISA techniques, Instrumentation related to biochemical techniques.

Detection of foreign matter; determination of loss on drying; determination of total ash; determination of extractive values; determination of particle consistency; estimation of iron, magnesium calcium content in a given sample; determination of volatile oil content; determination of alcohol content in a given liquid sample; determination of acid value; determination of saponification value; determination of refractive index; estimation of sugar - reducing and non-reducing. Qualitative test for detecting the presence of different group of phytochemicals, extraction and estimation of alkaloid, chemical analysis of medicinal plants as per the formate of Ayurvedic Pharmacopoeia of India, Yasad, Hingul, Shankha Bhasma, Lauha Bhasma, Tamra Bhasma.

Books Recommended :

1. The Ayurvedic Pharmacopoeia of India, Govt. of India Publication.
2. Different Pharmacopoeias like I.P., B.P. etc.
3. A.O.A.C.

Second Year

Subject : Pharmaceutical Technology of Ayurvedic Drugs - I

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

2 Hours-Practical **Practicals – 100 Marks**

1. Powders, Churnas, Kwath churnas : Advantages and limitations as dosage form, manufacturing procedures and equipments, special care and problems in manufacturing powders, Granules.
2. Internally administrated solutions: Diffusible and indffusible solids.
3. Tablets, Pills : Types, ideal requirements, classification, granulation methods, general formulation, compression machines, difficulties in preparation, evaluation, sugar coating, film coating compression coating.
4. Suspensions:- Types manufacturing procedure.
5. Emulsions: - Types, emulsifying agents, manufacturing procedure, evaluation methods.
6. Semisolids :- Definitions, bases, general formulation, manufacturing procedure.

Practicals :- Practicals related to above topics.

1. Remington's Clinical practice of pharmacySciences.
2. Industrial Pharmacy - Lachman and others.
3. Physical Pharmaceutics - Shotten and Ridgway.
4. Bentleys Text Book of Pharmaceutics - Rawlins.
5. American Pharmacy - Sprowls and Beal.

Second Year

Subject : Pharmaceutics - Physical Pharmacy

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

2 Hours-Practical **Practicals – 100 Marks**

Brief Introduction to Following Topics:

1. Metrology - metric-Imperial and S.I.
2. Matter-state and selected properties to limited topics.
3. Introduction to different properties of various Ayurvedic preparations e.g. density, viscosity, consistency, homogeneity, refractive index, sugar content
4. Surface phenomena.
5. Viscosity and rheology.
6. Colloidal dispersion and gells.
7. Coarse dispersion and emulsions.
8. Solutions.
9. Adsorption.
10. Thermodynamics.
11. Thermo chemistry.
12. Catalysis.
13. Introduction to chemical equilibrium. Refrective index determination, density determination, viscosity determination; use of screengauge, vernier caliper, hardness and disintration of tablets and vaties.

Practicals:

1. Refractive index determination
2. Density determination
3. Viscosity determination
4. Use of screw gauge, vernier caliper
5. Hardness & disintegration of tablets and pills.

Books Recommended:

1. Tutorial Pharmacy - Cooper and Gunn.
2. Physical Pharmaceutics - Shotton and Ridgway.
3. Physical Pharmacy - Mertin and others.
4. Remington's Pharmaceutical Sciences.
5. Text book of Physical Pharmaceutics - C.V.S. Subrahmanyam

Third Year

Subject : Rasa Shastra and Bhaishajya Kalpana - III

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

2 Hours-Practical **Practicals – 100 Marks**

Section - I **50 Marks**

- Maharasa, Uparasa, Sadharana Rasa their identification, varities, Shodhana, Marana, Sattvapatan processes, its dosage & usage.
- Dhatu varga - Swarna, Rajat, Tamra, Loha, Vanga, Yashada, Naga, Kamsya, Pittal, Vartaloham their identificaiton, varities, Shodhana-Marana processes; their dosage & therapeutic uses.

Section - II **50 Marks**

- Sneha Kalpana - Definition, types of sneha-paka, Murcchana, importance of Murchana, Method of Sneha-paka, Some known Taila-Ghrita formulations-their dosage & therapeutic uses.
- Sandhana Kalpana- Definition; its importance, varities (types) of Sandhana - their method of preparation, uses and dosage. Preparation of some well known - Asava, Arista, their dosage and therapeutic uses.
- Pathya Kalpana, Manda, Peya, Vilepi, Yavagu, Krishra, Anna Bhakta, Yusha, Mamsarasa, Khada, Kambalika, Raga, Shadav, Vatyodan, Sikta, Veshwara, Takra, Udashrita, Mathita, Katwara, Dadhi Kurchika their preparation methods & uses.

Dipan	Pachana	Samana
Shodhan	Sansraya	Bhedana
Rechan	Chedana	Lekhana
Stambhan	Rasayana	Vagikava
Vyavayi	Vikashi	Madakavi
Pramathi	Abishyandi	Yogavahi
Prabhava		

Third Year

Subject : Dravyaguna Vijnana - III

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

2 Hours-Practical **Practicals – 100 Marks**

1. Description and determination of main actions.
2. Characteristic of Samanya pratyarabdha and Vichitra pratyarabdha Dravyas.
3. Knowledge of the properties, effects, and uses of following drugs of Animal origin. Kasturi, Gorochana, Prawala, Mukta, Shankha, Sahbuka, Varatika, Shukti, Mrigashringa, Civet.
4. Identification of medicinal herbs with their parts used along with their main pharmacological properties and uses.
5. The collection of drugs and the characteristics of collected drugs. Preservation of collected drugs by dry and wet method.
6. Identification and study of the following drugs.

(1) Guduchi (2) Manjishtha (3) Kutaja
(4) Dhatura (5) Pippali (6) Arjuna
(7) Vasa (8) Anantamula (9) Ashwagandha
(10) Shatavari (11) Yastimadhu (12) Nimbuka.
(13) Ashoka (14) Sarpagandha (15) Bakuchi
(16) Vacha (17) Bhallataka (18) Vijayasara
(19) Kokilaksha

7. Study of Controversial drugs: Genesis, factors responsible for controversy, steps to resolve controversy. Study of drugs like Rasna, Pashangbheda, Amlavetasa, Brahmi, Murva, Sankhapushpi.
8. The knowledge of following drugs regarding the classification, Latin name, Family, Synonyms, Botanical description, Varieties, Habitate, Chemical composition, Properties, Doshakarma, Actions, Uses, Parts used, Dosage, Formulation, Substitute and Adulterants.

1. Avartani	26. Hansaraja	51. Nadihingu
2. Avartaki	27. Ingudi	52. Nala
3. Ashmantaka	28. Kakamachi	53. Nagakeshara
4. Amra	29. Kadamba	54. Parpataka
5. Aralu	30. Kadali	55. Pashanabheda
6. Amlavetasa	31. Kankushtha	56. Patalargarudi
7. Ahiphena	32. Kamala	57. Pilu
8. Bhanga	33. Kushtha	58. Rumimastagi
9. Bijaka	34. Kumuda	59. Rasna
10. Bada	35. Kasthadaru	60. Shallaki
11. Babula	36. Ketaki	61. Swarnakshiri
12. Bharngi	37. Kajutaka	62. Sahachara
13. Champaka	38. Kokilaksha	63. Sahadevi
14. Chandrashura	39. Khatmi	64. Shala
15. Chavya	40. Kullattha	65. Shatpushpa
16. Chirabilva	41. Kushmanda	66. Shringataka
17. Dugdhapheni	42. Latakasturi	67. Shara
18. Dronapaushpi	43. Lajjalu	68. Shati
19. Dhanwayasa	44. Langali	69. Surana
20. Eranadkarkati	45. Majuphala	70. Suranjana
21. Gandhaprasarini	46. Mashaparni	71. Surpunnaga
22. Gojihva	47. Makhanna	72. Tila
23. Hingu	48. Madayantika	73. Tagara
24. Hinsra	49. Murva	74. Taruni
25. Hritpatri	50. Nilini	

Practicals :

Preparation of Herbarium sheets of 50 drugs
Method of Identifications of drugs
Description and identification of important drugs mentioned in the theory
Compilatory essay of 25 pages on any drugs.

Third Year :

Subject : Pharmacognosy of Ayurvedic Drugs - III

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

2 Hours-Practical **Practicals – 100 Marks**

I. Knowledge of Alkaloids present in : *Vasaka, Datura*, Indrayava, Parasikayavani, Arkapatri, Kutaja, Kupilu (Karaskara), Soma (Ephedra), Patha Puga, Maricha, Vatsanabha, Ativisha, Ahiphena, Punarnava, *Shankhapuspi, Sarpagandha,* and Daruharidra.

II. Knowledge of Volatile oils aromatic oils /Resins/ Resin Combinations Present in - Musta, Kulanjana, Kushtha, Ardraka, Haridra, Trivrit, Vijaya, Indravaruni, Vidanga, Kampillaka, Nagakesara, Guggulu, Shallaki, Sarala, Sarjarasa, Hingu.

III. Fixed oils and Waxes present in - Eranda, Tila, Karanja, Nimba, Jyotishmati, Madhucchishta (beeswax).

IV. Miscellaneous - Atmagupta, Gunja.

V. **Other topics -**

Factors affecting drug constituents

Evaluation of the crude drugs

Quantitative microscopy – Vein-islet number, Palisade ratio, Stomatal index, Measurement of elements like Trichomes, Crystals, Xylem vessel, Fiber, Stone cells etc.

Isolation of - Vittae, laticiferous vessels, Xylem elements etc.

Rasayana, Anticancer, and Adaptogenic drugs.

Natural Pesticides and Allergens.

Practical :

Systematic morphological and microscopic study of the drugs underlined from the list mentioned above.

1. Morphology and microscopy of Datura leaf. Powder study of Datura leaf.
2. Morphology of Vasaka and Arkapatri. Microscopy of Vasaka and its powder.
3. Morphology and T.S. of Soma stem (Ephedra).
4. Morphology and microscopy of Kutaja. Powder, study of Kutaja bark.
5. Morphology of seeds of - Atmagupta, Gunja, Indrayava, Puga, Parasikayavani, and T.S. of Kupilu (Karaskara).
6. Morphology of fruits of - Maricha, Vidanga, Indravaruni. Nagakesara. Powder of Vidang and Kampillaka.
7. Morphology and microscopy of Shankhapushpi - Whole Plant.
8. Morphology and microscopy of Sarpagandha root and its powder study.
9. Morphology and microscopy of Patha root.
10. T.S. of Kulinjan and morphology of Trivrit, Ativisha, Vatsanabha, Daruharidra, Mustra, Kushta and Punarnava.
11. Morphology and microscopy of Ardraka Rhizome and its powder.
12. Study of unorganised drugs - Resin and resin combinations - Guggulu, Shallaki, Saral, Sarjarasa, Hingu.

    Fixed oils - Eranda, Karanja, Nimba, and Joytishmati Taila.

    Waxes - Madhuchishta (Beeswax).

13. Determination of Vein islet number and Vein termination number.
14. Determination of Stomotal index and Palisade ratio.
15. Isolation of Vittae and Laticiferous vessels.
16. Isolation of Xylem elements.

List of teachers assigned teaching at Barkachha for B. Pharma (Ay.)

	Theory (Hours)	**Practical (Hours)**	**Total**
Sharira Rachana :	**45**	**45**	**90**
Dr. H.H. Awasthi	15	15	30
Dr. K.N. Singh	15	15	30
Dr. Sunil Kumar	15	15	30
Anotomy :	**30**	**60**	**90**
Dr. Shyamal			
Shrira Kriya :	**45**	**45**	**90**
Dr. Sangeeta Gehot	25	20	45
Dr. Kishor Patwardhan	20	25	45
Physiology :	**45**	**45**	**90**
Dr. Mandal			
Fundamental Principles of Ayurveda	**60**	–	**60**
Dr. B.K. Dwibedy	10	–	10
Dr. P.K. Goswami	10	–	10
Dr. Rani Singh	10	–	10
Dr. Muralidhar Paliwal	10	–	10
Dr. Neeru Nathani	10	–	10
Dr. Mangalagowri V. Rao	10	–	10
Samskrit :	**60**	–	**60**
Dr. G.L. Meena	60	–	60
Pharmaceutical Chemistry	**120**	**90**	**120**
Dravyaguna :	**60**	**60**	**120**
Prof. V.K. Joshi	15	15	30
Prof. S.D. Dubey	15	15	30
Dr. K.N. Dwivedi	15	15	30
Dr. Anil Kumar Singh	15	15	30
Rasashastra & Bhaishajya Kalpana :	**90**	**90**	**180**
Prof. C.B. Jha	**25**	**20**	**45**
Dr. K.R.C. Reddy	**25**	**20**	**45**
Dr. Neeraj Kumar	**20**	**25**	**45**
Dr. A.K. Chaudhary	**20**	**25**	**45**

Third Year

Subject : Pharameceutical Analysis of Ayurvedic Drugs - II

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

2 Hours-Practical **Practicals – 100 Marks**

1. Introduction of instrumental Analysis
2. U.V. Visible Spectrophotometry.
3. Introduction to I.R., N.M.R. & Mass Spectrophotometry
4. pH metry, Potentiometry Fluorimetry.
5. Flame Photometry, phosphorimetry, turbidimetry, nephelometry.
6. Chromatography - Liquid Chromatography, T.L.C., Paper Chromatography, Gas Chromatography, Ion-exchange Chromatography.
7. Polarography.
8. Use of Chromatographic & Spectrophotometric methods for Standardisation and evaluating quality of Ayurvedic Drugs.

Practicals :-

Suitable practicals to illustrate the above topics.

Books Recommended

1. Instrumental methods of analysis-Willard, Merrit, Dean.
2. Practical Pharmaceutical Chemistry - Part - II - Beckett and Stenlake.
3. Instrumental methods of Chemical Analysis - Ewing.
4. A Text-book of Pharmaceutical Analysis - Connors.
5. Pharmaceutical Analysis - Dr. S. Ravishankar.
6. Pharmaceutical Analysis - Dr. A. V. Kasture.

Third Year

Subject : Pharameceutical Technology for Ayurvedic Drugs -II

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

2 Hours-Practical **Practicals – 100 Marks**

1. Liquids (Solutions, syrups, elixirs, liquids for external use.) Definitions, general formulations, manufacturing procedures.
2. Pharmaceutical aerosols: Definitions, propellants, manufacturing and packaging methods.
3. Opthalmic preparations and ENT preparations : Requirements, methods of preparation, containers.
4. Cosmetic formulations: Creams, powders moisturizers.
5. Packing materials.
6. Capsules : Hard gelatin, Soft gelatin, filling technique etc.

Practicals :

Suitable Practicals related to above topics.

Book Recommended

1. Remington's Pharmaceutical Sciences.
2. Industrial Pharmacy - Lachman and others.
3. Physical Pharmaceutics - Shotton and Ridgway.
4. American pharmacy - Sprowis and Beal.

Third Year

Subject : Pharmaceutical Engineering

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

1. Size reduction - objectives, factors affecting, energy requirement, mechanism, methods-cutting-roller, mill-hamour, mill-ball, mill-fluid energy, mill-colloid mill-edge runner mill, selection of equipments, selection of degree of size reduction.
2. Size separation.
3. Leaching and extraction.
4. Evaporation.
5. Distillation and condensation.
6. Drying.
7. Crystallization.
8. Small scale emulsifiers.
9. Mixing.

Books Recommended

1. Tutorial Pharmacy - Carter.
2. Industrial Pharmacy - Lachman and others.
3. Elementary Chemical Engineering - Peters (for mathematical problems).
4. Hand-book of Chemical Engineering - Parry.
5. Unit operations of Chemical Engineering - Mccabe and Smith.

Third Year

Subject : Pharmacology & Toxicology of Ayurvedic Drugs

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

2 Hours-Practical **Practicals – 100 Marks**

Theory

1. General introduction to pharmacology and its role in the field of Ayurveda.
2. Definitions.
3. Nature and source of drugs.
4. Routes of drug administration.

5. Drug transport and storage.
6. Biotransformation (drug metabolism) - different types and factors modifying it.
7. Drug excretion.
8. Site and mechanism of drug action including study of drug receptors.
9. Factors modifying effect of drugs.
10. Drug interactions
11. Autonomic nervous system – cholinergic and adrenergic receptors.
12. Type of drugs for the treatment of GI tract diseases.
13. Appetizers, Digestants, carminatives, Emetics, anti-emetics. Laxative & anti-diarrhoea, Pharmaco therapy of peptic ulcer.
14. Drgu activity affecting Central nervous system - hypnotic, anti-anxiety, anti-convulsant, anti-parkinsonism and anti-psychotic effects.

Practicals :-

1. General information on laboratory animals.
2. Dose fixation.
3. Gross behavioural study in mice.
4. Hypnotic potentiation effect assessment.
5. Behavioural 'despair' test for assessing anti-depressant activity.
6. Open field behaviour test.
7. Elevated plus maze test for assessing anti-anxiety activity.
8. Tunnel board test for assessing effect on exploratory behavior.
9. Techniques for assessing analgesic activity.
10. Carrageenin hind paw test for assessing anti-inflammatory activity.
11. Setting up of isolated tissue for experimentation.

Fourth Year

Subject : Rasa Shastra and Bhaishajya Kalpana-IV

Time : 3 Hours – Theory **Theory – 100 Marks**
2 Hours-Practical **Practicals – 100 Marks**

Section - I (Rasa Shastra - 50 Marks)

- Ratna-Uparatna their classification, varieties, identification shodhana-marana & Pistikaran procedures; their therapeutic dosage & indications, Importance.
- Sudha Varga-Lavana Varga-Kshar Vrga-Sikta Varga, Visha-Upvisha Varga.
- Different Formulations of Rasa Aushadhis.
- Drug & cosmetic Act 1940; Standardizaiton of Rasa Aushadhis
- Druti Kalpana.

Kajjali	Samguna
	Ardhaguna
	Dviguna.
Parpati	Rasa
	Panchamrut
	Tamra
	Sweta
	Loha
Pottali	Hemagarbha.
	Abragarbha.
Kupipakva	Rasasindur
	Gandhakdviguna
	Mallarsindoor
	Swarna vanga
	Rasakarpoor
Khalaliya	Tribhuvankirtirasa
	Ichchabhedirasa
	Navajivan Rasa

Section - II (Bhaishajya Kalpana - 50 Marks)

Topical Applications - Types of Lepa; Preparatory methods, usage, Malahara, Upanaha, Sata dhoutaghrita, Sahasra dhouta ghrita.

Ocular & ENT Preparations

Drava, Avijana, Ashchyotan, Vidalaka, Tarpana, Putapaka, Kaval, Gandusha, Manjana, Nasya, Pradhamana, Dhumapana, Nasal Preparations.

Basti Kalpanas - Different Basti Kalpanas & method of usage

Standardization of Bhaishajya formulations

Drug & Cosmetic Rule 1945.

Devadaryyadi Kwath	Pathyadi Kwatha
Phalatrikadi Kwath	Manyisthadi Kwath
Rasanasaptaka Kwatha	Sitopaladi churna
Hinguvastaka Churna	Gangadhara churna
Pushyanuag Churna	Balachaturbhadra churna
Triphala Guggulu	Abha Guggulu
Yograja Guggulu	Kaishor Guggulu
Sinhanada Guggulu	Agnitundi vati
Khadiradi vati	Chitrakadi vati
Shankha vati	Rajhapravartini vati
Jatyadi tail	Vishgarbha tail
Panchaguna tail	Shadabindu tail
Panchatikta ghrita	

R.S.

Anandbhairav rasa	Arogyavardhini rasa
Arshakuthar rasa	Kumduiha rasa
Krimikuthara rasa	Garbhaapal rasa
Gandhaka rasayana	Chundamurutan
Chadrakala rasa	Chadraprabha vati
Tribhuvankirti rasa	Navjivan rasa
Nidrodaya rasa	Punarnava Mandoor
Laxmivilas rasa	Vatvidhvanasa rasa
Shonitargal rasa	Shwasa kuthara rasa
Pravalpunchumruta rasa	Samirpannga rasa
Makardhvaja	Kchadhedirasa
Ekangvirrasa	Laghu, Kustruibharivara rasa
Chandramruta rasa	

Practicals : Preparation of different types of formulations atleast 20.

Fourth Year
Subject : Pharmaceutical Analysis of Ayurvedic Drugs-III

Time : 3 Hours – Theory **Theory – 100 Marks**
2 Hours-Practical **Practicals – 100 Marks**

1. Standardisation and Quality Control of Ayurvedic drugs, Introduction and background.
2. Parameters included in Ayurvedic pharmacopoeia of India in part-I.
3. Standardization of raw materials, finished products and packaging material.
4. Process standardization.
5. In process control.
6. Good laboratory practices.
7. Good Manufacturing practice.
8. U.V.Visible spectrophotometry, I.R., N.M.R. & Mass Spectrophometry as applicable to Ayurvedic drugs.
9. Atomic absorption spectroscopy.

Practicals :

Analysis of different types of Ayurvedic formulations.

Books Recommended

1. The Indian Pharmaceutical Codex, Vol. 1-B. Mukherji.
2. The Ayurvedic Formulary of India Part-I & Ii, Govt. of India Publication.
3. Thin Layer Chromatography - A Laboratory hand book, Bpriger Insternational students edition-Japan by E.Stahl.
4. Textbook of Pharmaceutical Analysis - Dr. S. ravishankar.
5. A text of quantitative inorganic analysis by A.I. Vogel.

6. The quantitative analysis of drugs, by D.C. Garrett.
7. Pharmacopoeia of India, Government of India Publication.
8. The Ayurvedic pharmacopoeia of India Vol - I, Govt. of India Publication.
9. A.O.A.C.
10. Plant Drug Analysis, Springer Werlag by Ascott.

Fourth Year

Subject : Pharmaceutical Technology for Ayurvedic Drugs-III

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

2 Hours-Practical **Practicals – 100 Marks**

1. Parentrals - Product requiring sterile packing. Definition type advantage & limitation. General formulation, vehicle, production procedure, production facilities, control tests.
2. Sustained release formulation.
3. Microencapsulation.
4. Novel Drug Delivery system.
5. Pilot plan scale up.
6. Reformulation.
7. Suppositories.
8. Preservatives.

Practicals :

Suitable Practicals to Cover above topics.

Fourth Year

Subject : Pharmaceutical Bio-Chemistry

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

2 Hours-Practical **Practicals – 100 Marks**

1. Introduction to the science of Microbiology.
2. Microscopy :- Microscopies, their magnification, resolution, illumination and filters, working of different types of microproscopes, micrometry.
3. Classification of microbes and their taxonomy - Protozoa, fungi, actinomycets, bacteria, ricketssia spirochaetes and viruses.
4. Nutrition, cultivation, isolation and identification of bacteria, actnomycets, fungi, viruses.
5. Bacterial enzymes.
6. Control of microbes by physical and chemical methods.
7. Disinfection, factors influencing disinfection, dynamics of disinfection, disinfectants and antiseptic and their evaluation.
8. Sterilisation, different methods, evaluation of sterilization methods.
9. Sterility testing of Pharmaceutical products.
10. Microbial attach and host defence, Virulance and pathogencity, primary and specific defensive mechanisms of body, infection and its transmission, interferons.

Pharmaceutical Microbiology Practicals:

Experience devised to prepare various types of culture media, sub-culturing of common aerobic and anaerobic bacteria, fungus and yeast, various staining methods of isolation and identification of microbes, sterilizing techniques and evaluation of sterilizing techniques, evaluation of antiseptics and disinfectants, testing the sterility of Pharmaceutical products, evaluation of potency of antibiotics.

Books Recommended

1. Text-book of Microbiology - Frobisher.
2. Laboratory Manual of Batteriology - Salle.
3. Tutorial Pharmacy - Carter.

Fourth Year

Subject : Pharmacology & Toxicology of Ayurvedic Drugs - II

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

2 Hours-Practical **Practicals – 100 Marks**

1. Drugs used in the treatment of Respiratory tract disorders.
   (a) Pharmacotherapy of cough.
   (b) Pharmacotherapy of bronchial asthma and related air-way inflammations.
2. Drugs used in the treatment of cardiovascular system.
   a) Pharmacotherapy of hypertension.
   b) Pharmacotherapy of arrythmia.
   c) Pharmacotherapy of cardiac failure.
   d) Pharmacotherapy of angina pectoris.
3. Drugs affecting renal functions.
4. Drugs and the skin.
5. Chemotherapy
   A. General principles of chemotherapy of infections.
   B. Brief study of important antibiotics.
   C. Brief study of important anti-protozoa agents.
   D. Brief study of important anti-fungal agents.
   E. Chemotherapy of malignancy.
6. Immunomodulation
7. Anti-inflammatory and anti-rheumatic drugs.
8. Drugs acting on Blood & Blood forming organs.

Practicals :

1. Pyloric ligation to induce Gastric ulcer.
   i. Estimation of free & total acidity in 'gastric juice'.
   ii. Estimation of total carbohydrates in gastric juice.
   iii. Estimation of protein in gastric juice.
   iv. Estimation of peptic activity.

2. Evaluation of test drugs for anti-convulsant activity

   (i) MES

   (ii) Pentylenetetrazol convulsion.

3. Evaluation of test drugs for immunomodulation effect.

   a) Antibody estimation

   b) Immunological oedema (CMI).

4. Evaluation of test drugs for adaptogen activity.

5. Conditional avoidance response test using cook's pole climbing apparatus.

6. Study of oestrous cycle in rats-through vaginal smear technique.

7. Anti-reserpine test.

Books Recommended

As mentioned under B.Pharma III syllabus.

Screening methods in pharmacology I & II R.A. Turner.

Fourth Year

Subject : Forensic Pharmacy - Acts Rules & Regulations & Management Pharmaceutical

Time : 3 Hours – Theory **Theory – 50 Marks**

Section - I Forensic Pharmacy - Acts, Rules and Regulations -

1. Pharmaceutical legislation - history and background.
2. The Pharmacy Act- objectives and contents.
3. Narcotic drug legislation.
4. Drugs and Cosmetics Act and rules there under - implementation machinery.
5. Shops & Establishment Act.
6. Poisonous drugs Act.
7. Code of Pharmaceutical ethics.
8. Prevention of cruelty to Animals Act.
9. Drug & Magic remedies.

Section - II Pharmaceutical Management **50 Marks**

1. Plant location & lay-out of an industry-various affecting location aspect, layout of building and equipments. Product layout v/s. process layout.

2. Production planning & control - scientific purchasing, quality control, problems of productivity stores organization, location of store, receiving and issues from the store and control of stores and stocks.
3. Personnel management - selection, appointment, training, transfer, promotion, demotion policies, remuneration, job evaluation.
4. Sales organization - market definition - different approaches to the study of marketing, Institutional approach, manufacture's methods of marketing, wholesalers, retailers, functional approach various functions of marketing - cost & efficiency in marketing, commodity approach.

   Distribution policies - selective & exclusive distribution, pricing & discount policies, credit policies, trade identification marks, patent policies.

   Sales promotion policies - advertisement, detailing, sampling, window and interior display, advertisement to physicians, professional persons, consumers.
5. Budgets and budgetary controls.