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.

( 1 )
DETAILED 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

<table>
<thead>
<tr>
<th>S.No</th>
<th>Subject</th>
<th>Theory Marks</th>
<th>Practical Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Rasa Shastra and Bhaishajya Kalpana – 1</td>
<td>100</td>
<td>100</td>
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<tr>
<td>2</td>
<td>Dravyaguna Vijnana – 1</td>
<td>100</td>
<td>100</td>
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<tr>
<td>3</td>
<td>Ayurveda Sharir Kriya Evam Rachana Vigyana</td>
<td>100</td>
<td>100</td>
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<tr>
<td>4</td>
<td>Pharmaceutical Chemistry (Inorganic and Organic)</td>
<td>100</td>
<td>100</td>
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<td>5</td>
<td>Pharmaceutical Biology</td>
<td>100</td>
<td>100</td>
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<tr>
<td>6</td>
<td>Anatomy and Physiology</td>
<td>100</td>
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<tr>
<td>7</td>
<td>Sanskrit</td>
<td>50</td>
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<tr>
<td>8</td>
<td>Fundamentals of Ayurveda including Swastha vritta</td>
<td>100</td>
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</table>
## Second Year

<table>
<thead>
<tr>
<th>S.No.</th>
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<th>Practical Marks</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Rasa Shastra and Bhaishajya Kalpana – II</td>
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<tr>
<td>2</td>
<td>Dravyaguna Vijnana - II</td>
<td>100</td>
<td>100</td>
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<tr>
<td>3</td>
<td>Dosha, Dhatu, Mala Vijnana</td>
<td>100</td>
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<tr>
<td>4</td>
<td>Pharmacognosy of Ayurvedic Drugs – I</td>
<td>100</td>
<td>100</td>
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<td>5</td>
<td>Pharmaceutical Biochemical Analysis of Ayurvedic Drugs -I</td>
<td>100</td>
<td>100</td>
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<tr>
<td>6</td>
<td>Pharmaceutical Technology of Ayurvedic Drugs - I</td>
<td>100</td>
<td>100</td>
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<td>7</td>
<td>Pharmaceutics - Physical Pharmacy</td>
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## Third Year

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<thead>
<tr>
<th>S.No.</th>
<th>Subject</th>
<th>Theory Marks</th>
<th>Practical Marks</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Rasa Shastra and Bhaishajya Kalpana - III</td>
<td>100</td>
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<tr>
<td>2</td>
<td>Dravyaguna Vijnana - III</td>
<td>100</td>
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<td>3</td>
<td>Pharmacognosy of Ayurvedic Drugs - II</td>
<td>100</td>
<td>100</td>
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<tr>
<td>4</td>
<td>Pharmaceutical Analysis of Ayurvedic Drugs - II</td>
<td>100</td>
<td>100</td>
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<tr>
<td>5</td>
<td>Pharmaceutical Technology for Ayurvedic Drugs –II</td>
<td>100</td>
<td>100</td>
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<tr>
<td>6</td>
<td>Pharmaceutical Engineering</td>
<td>100</td>
<td>100</td>
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<tr>
<td>7</td>
<td>Pharmacology &amp; Toxicology of Ayurvedic Drugs –I</td>
<td>100</td>
<td>100</td>
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</table>

## Fourth Year

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Subject</th>
<th>Theory Marks</th>
<th>Practical Marks</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Rasa Shastra and Bhaishajya Kalpana-IV</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>Pharmaceutical Analysis of Ayurvedic Drugs-III</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>3</td>
<td>Pharmaceutical technology for Ayurvedic Drugs-III</td>
<td>100</td>
<td>100</td>
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<tr>
<td>4</td>
<td>Pharmaceutical Microbiology</td>
<td>100</td>
<td>100</td>
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<tr>
<td>5</td>
<td>Pharmacology &amp; Toxicology of Ayurvedic Drugs - II</td>
<td>100</td>
<td>100</td>
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<td>6</td>
<td>Forensic Pharmacy Acts Rules &amp; Regulations &amp; Pharmaceutical Management</td>
<td>50</td>
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(3)
First Year

Rasa Shastra and Bhaishajya Kalpana – 1

Time : 3 Hours – Theory

2 Hours-Practical

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.
- Classification of Rasa drugs.

<table>
<thead>
<tr>
<th>Yantra</th>
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<tbody>
<tr>
<td>Dola Yantra</td>
<td>Damaru Yantra</td>
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<tr>
<td>Vidyardhar Yantra</td>
<td>Swedan Yantra</td>
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<tr>
<td>Patan Yantra</td>
<td>Baluka Yantra</td>
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<td>Bhudhar Yantra</td>
<td>Patala Yantra</td>
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<tr>
<td>Khalva Yantra</td>
<td>Kanduk Yantra</td>
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<tr>
<th>Musa</th>
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</thead>
<tbody>
<tr>
<td>Vajra</td>
<td>Vajra dravini</td>
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<tr>
<td>Vajra dravana</td>
<td>Varnya</td>
</tr>
<tr>
<td>Rupyaa</td>
<td></td>
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<tr>
<td>Bida</td>
<td>Gara</td>
</tr>
<tr>
<td>Vrantaka</td>
<td>Gostani</td>
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<tr>
<td>Malla</td>
<td>Pakva</td>
</tr>
<tr>
<td>Gola</td>
<td>Maha</td>
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<tr>
<td>Manduka</td>
<td>Mushal</td>
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</tbody>
</table>

( 4 )
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 preservation 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
2 Hours-Practical

Theory – 100 Marks
Practicals – 100 Marks

- Definition of Dravyaguna vijnana and its importance.
- Definition of Dravya, its importance panchabhaud composition and classification.
- Definition of Rasa its types and panchabhaud 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
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, Botanical description, Varieties, Habitat, Chemical composition, Properties,
   Doshakarma, Action, Uses, Parts used Dosage, Formulations, Substitute and Adulteration.

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<tr>
<td>3. Arjuna</td>
<td>27. Chitraka</td>
<td>51. Shankhapushpi</td>
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<tr>
<td>4. Ashwagandha</td>
<td>28. Mandukaparni</td>
<td>52. Sudarshana</td>
</tr>
<tr>
<td>5. Arka</td>
<td>29. Patha</td>
<td>53. Tulsi</td>
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<tr>
<td>8. Bala</td>
<td>32. Chandana</td>
<td>56. Vamsa</td>
</tr>
<tr>
<td>11. Dhatura</td>
<td>35. Latakaranja</td>
<td>59. Vijayasara</td>
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<tr>
<td>12. Ela</td>
<td>36. Varahikanda</td>
<td>60. Vidanga</td>
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<tr>
<td>16. Haritaki</td>
<td>40. Maricha</td>
<td>64. Chandana</td>
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<tr>
<td>17. Haridra</td>
<td>41. Manjishtha</td>
<td>65. Mustaka</td>
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<tr>
<td>18. Jyotishmati</td>
<td>42. Parisha</td>
<td>66. Prishniparni</td>
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<tr>
<td>20. Kapi kachchu</td>
<td>44. Pippali</td>
<td>68. Choraka</td>
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<tr>
<td>22. Karanja</td>
<td>46. Sariva</td>
<td>70. Vata</td>
</tr>
<tr>
<td>23. Kumari</td>
<td>47. Shirisha</td>
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<tr>
<td>24. Plaksha</td>
<td>48. Shatavari</td>
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</tbody>
</table>

**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

Practicals

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.


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


10. Pitta 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.
5. Reactivity of metal.
7. Titrimetric 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.

( 8 )
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**


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**First Year**

**Subject: Pharmaceutical Biology**

Time: 3 Hours – Theory
2 Hours-Practical

**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.
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.

   a. Malarial parasites.
   b. Leishmania.
   c. Trypanosoma.
   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.
5. Epidermal structure of leaf with special reference to stomata and trichomes.

First Year
Subject: Anatomy, Physiology

Time: 3 Hours – Theory
2 Hours-Practical

THEORY

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

1. Scope of Anatomy and Physiology.
2. Terminology of Anatomy
4. Skeletal System.

( 10 )
5. Skeletal muscles of the body.
6. Central Nervous system.
8. Lymphatic system
9. Cardiovascular system
10. Digestive system
11. Endocrine glands
12. Respiratory system
14. Urinary System
15. Reproductive system – Female Reproductive system, Male Reproductive system.

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

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**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 conjugation.

**C.** Pronouns and Numeric.

**D.** Consonant ending words and fifth and eight conjugation.

( 11 )
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

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
2 Hours-Practical

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
Concept of Shodhana, Marana & Sattvapatan.
Study of Bhasma – Sindura Kalpa.

( 12 )
Section – II (Bhaishajya Kalpana – 50 Marks)


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


Practicals

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
2 Hours-Practical
Theory – 100 Marks
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.


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 |

( 13 )
| 5. Ashwagola | 31. Kanchanara | 57. Rudraksha |
| 8. Akarakara | 34. Karavira | 60. Shigru |
| 12. Bhallataka | 38. Lavanga | 64. Shringataka |
| 15. Chakramarda | 41. Meshashringi | 67. Talishapatra |
| 16. Danti | 42. Mamajjaka | 68. Talamuli |
| 17. Draksha | 43. Mishrey | 69. Usira |
| 18. Dhanyaka | 44. Musali | 70. Vrihadaila |
| 21. Gunja | 47. Puskarmula | 73. Patalagarudi |
| 22. Irmeda | 48. Priyangu | 74. Vikankata |
| 23. Kupiulu | 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


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
2 Hours-Practical

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

II. Drugs containing Carbohydrates -
   Mucliajes - Isabgola, Brihat gokshura, Bilvaphal, Svetamusli.

III. Drugs containing Glycosides.
   Anthraquinones - Svarnapatri, Kumari, Manjishta, Aragvdha, Chakramarda. Cardiac - Karavira, Arka, Vanapalandu, Digitalis.
   Bitters - Kiratikta, Katuki, Guduchi.

IV. Drugs containing Volatile Oils -

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.
8. T.S. and powder of Atasi.

( 15 )
16. T.S. powder of Lavangi
17. T.S. of Svetachandan and Morphology of Raktachandana, Devadaru, Palasha and Kesar.

Second Year

Subject : Pharmaceutical Biochemical Analysis of Ayurvedic Drugs - I

Time : 3 Hours – Theory
2 Hours-Practical

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, arithas, 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.
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 indiffusible solids.
5. Emulsions: - Types, emulsifying agents, manufacturing procedure, evaluation methods.

Practicals: - Practical related to above topics.
1. Remington's Clinical practice of pharmacy Sciences.
2. Industrial Pharmacy - Lachman and others.
3. Physical Pharmaceutics - Shotton and Ridgway.
5. American Pharmacy - Sprowls and Beal.
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.
10. Thermodynamics.
11. Thermo chemistry.
12. Catalysis.
13. Introduction to chemical equilibrium. Refractive index determination, density determination, viscosity determination; use of screengauge, vernier caliper, hardness and disintegration of tablets and vatics.

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.
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, varieties, Shodhana, Marana, Sattvapatan processes, its dosage & usage.
- Dhatu varga - Swarna, Rajat, Tamra, Loha, Vanga, Yashada, Naga, Kamsya, Pittal, Vartaloham their identification, varieties, 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, varieties (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, Krishna, Anna Bhakta, Yusha, Mamsarasa, Khada, Kambaliaka, Raga, Shadav, Vatyodan, Sikta, Veshwara, Takra, Udashrta, Mathita, Katwara, Dadhi Kurchika their preparation methods & uses.

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<tr>
<th>Dipan</th>
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<th>Samana</th>
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<td>Shodhan</td>
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<td>Rechan</td>
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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 pratyarabdh and Vichitra pratyarabdha Dravyas.
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) Nimbukha.  
(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, Habitacle, Chemical composition, Properties, Doshakarma, Actions, Uses, Parts used, Dosage, Formulation, Substitute and Adulterants. 

| 2. Avartaki | 27. Ingudi | 52. Nala |
| 7. Ahiphena | 32. Kamala | 57. Pilu |
| 15. Chavya | 40. Kullattha | 65. Shatpushpa |
| 17. Dugdhapheni | 42. Latakasturi | 67. Shara |
| 18. Dronapushpi | 43. Laijalu | 68. Shati |
| 19. Dhanwayasa | 44. Langali | 69. Surana |
| 20. Eranadkarkati | 45. Majaphala | 70. Suranjana |
| 22. Gojihva | 47. Makhanna | 72. Tila |
| 23. Hingu | 48. Madayantika | 73. Tagara |
| 24. Hinsra | 49. Murva | 74. Taruni |
| 25. Hritpatra | 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.

( 20 )
Third Year:
Subject: Pharmacognosy of Ayurvedic Drugs - III

<table>
<thead>
<tr>
<th>Time: 3 Hours – Theory</th>
<th>Theory – 100 Marks</th>
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<tr>
<td>2 Hours-Practical</td>
<td>Practicals – 100 Marks</td>
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</table>

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


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.

3. Morphology and T.S. of Soma stem (Ephedra).
7. Morphology and microscopy of Shankhapushpi - Whole Plant.

Fixed oils - Eranda, Karanja, Nimba, and Joytishmati Taila.
Waxes - Madhucchishta (Beeswax).
13. Determination of Vein islet number and Vein termination number.
14. Determination of Stomatal index and Palisade ratio.
15. Isolation of Vittae and Laticiferous vessels.

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

<table>
<thead>
<tr>
<th>Subject</th>
<th>Theory (Hours)</th>
<th>Practical (Hours)</th>
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<td>Sharira Rachana :</td>
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<td>Dr. H.H. Awasthi</td>
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<td>Dr. K.N. Singh</td>
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<td>Dr. Sunil Kumar</td>
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<td>Anatomy :</td>
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<td>Dr. Mandal</td>
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<td>Fundamental Principles of Ayurveda</td>
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<td>Dr. B.K. Dwibedy</td>
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<td>Dr. Neeru Nathani</td>
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<td>Dr. Mangalagowri V. Rao</td>
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<td>Dr. G.L. Meena</td>
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<td>Pharmaceutical Chemistry</td>
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<td>Dravyaguna :</td>
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<td>Prof. V.K. Joshi</td>
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<td>Prof. S.D. Dubey</td>
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<td>Dr. Anil Kumar Singh</td>
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<td>Rasashastra &amp; Bhaishajya Kalpana :</td>
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<td>Prof. C.B. Jha</td>
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<td>Dr. Neeraj Kumar</td>
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<td>Dr. A.K. Chaudhary</td>
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( 22 )
Third Year
Subject: Pharmaceutical Analysis of Ayurvedic Drugs - II

Time: 3 Hours – Theory
2 Hours-Practical

Theory – 100 Marks
Practicals – 100 Marks

1. Introduction of instrumental Analysis
3. Introduction to I.R., N.M.R. & Mass Spectrophotometry
4. pH metry, Potentiometry Fluorimetry.
5. Flame Photometry, phosphorimetry, turbidimetry, nephelometry.
7. Polarography.

Practicals:-
Suitable practicals to illustrate the above topics.

Books Recommended
1. Instrumental methods of analysis-Willard, Merrit, Dean.
5. Pharmaceutical Analysis - Dr. S. Ravishankar.
6. Pharmaceutical Analysis - Dr. A. V. Kasture.

Third Year
Subject: Pharmaceutical Technology for Ayurvedic Drugs - II

Time: 3 Hours – Theory
2 Hours-Practical

Theory – 100 Marks
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.
5. Packing materials.
6. Capsules : Hard gelatin, Soft gelatin, filling technique etc.

( 23 )
Practicals:
Suitable Practicals related to above topics.

Book Recommended
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
2. Size separation.
3. Leaching and extraction.
4. Evaporation.
5. Distillation and condensation.
6. Drying.
7. Crystallization.
8. Small scale emulsifiers.

Books Recommended
1. Tutorial Pharmacy - Carter.
2. Industrial Pharmacy - Lachman and others.
3. Elementary Chemical Engineering - Peters (for mathematical problems).
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.
4. Routes of drug administration.

( 24 )
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.
10. Drug interactions
11. Autonomic nervous system – cholinergic and adrenergic receptors.
12. Type of drugs for the treatment of GI tract diseases.

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.
8. Tunnel board test for assessing effect on exploratory behavior.
11. Setting up of isolated tissue for experimentation.
Kajjali  
Samguna  
Ardhaguna  
Dviguna.

Parpati  
Rasa  
Panchamrut  
Tamra  
Sweta  
Loha

Pottali  
Hemagarbha.  
Abragarbha.

Kupipakva  
Rasasindur  
Gandhakdviguna  
Mallarsindoor  
Swarna vanga  
Rasakarpoo

Khalaliya  
Tribhuvankirtirasaa  
Ichchabhedirasaa  
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

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<td>Rasanasaptaka Kwatha</td>
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<td>Hinguvastaka Churna</td>
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<td>Pushyanuag Churna</td>
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( 26 )
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<td>Makardhvaja</td>
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<td>Laghu, Kustruibirivarasa rasa</td>
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Practicals: Preparation of different types of formulations atleast 20.

Fourth Year
Subject: Pharmaceutical Analysis of Ayurvedic Drugs-III

Time: 3 Hours – Theory
2 Hours-Practical

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.
5. In process control.
6. Good laboratory practices.
7. Good Manufacturing practice.

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.
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.

Fourth Year
Subject : Pharmaceutical Technology for Ayurvedic Drugs-III
Time : 3 Hours – Theory Theory – 100 Marks
       2 Hours-Practical Practicals – 100 Marks
2. Sustained release formulation.
3. Microencapsulation.
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 microscopes, micrometry.
3. Classification of microbes and their taxonomy - Protozoa, fungi, actinomycets, bacteria, ricketssia spirochaetes and 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.
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 Bacteriology - Salle.
3. Tutorial Pharmacy - Carter.

Fourth Year
Subject : Pharmacology & Toxicology of Ayurvedic Drugs - II

Time : 3 Hours – Theory
2 Hours-Practical

Theory – 100 Marks
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.

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.
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.
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
Time: 3 Hours – Theory

Section - I Forensic Pharmacy - Acts, Rules and Regulations -
1. Pharmaceutical legislation - history and background.
2. The Pharmacy Act- objectives and contents.
4. Drugs and Cosmetics Act and rules there under - implementation machinery.
5. Shops & Establishment Act.

Section - II Pharmaceutical Management 50 Marks
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.