

**MANAV BHARTI**  
**UNIVERSITY**

**B.PHARMACY**  
**AYURVEDA**

**COURSE STRUCTURE**

**2009**

# **MANAV BHARTI UNIVERSITY**

## **B.PHARMACY COURSE STRUCTURE**

### **SEMESTER- I**

**BP101** Ayurvedic sharir rachna and anatomy

**BP102** Ayurvedic sharir kriya and physiology

**BP103** Fundamentals of ayurveda

**BP104** Certificate programme in biology

**BP105** Basic computer

### **SEMESTER-II**

**BP201** Ayurvedic sharir rachana and anatomy

**BP202** Ayurvedic sharir Kriya and physiology

**BP203** Drvya guna vigyan -1

**BP204** Sanskrit

**BP205** Ras Shastra

**BP206** Pharmaceutical Chemistry

### **SEMESTER-III**

**BP301** Ras shastra

**BP302** Rog vigyan

**BP303** Drvya Guna Vigyan -2

**BP304** seminar on executive communication8

### **SEMESTER-IV**

**BP401** Bhaishjya kalpna

**BP402** Pharmacognosy of ayurvedic drugs-1

**BP403** Pharmaceutical analysis of ayurvedic drugs-1

**BP404** Pharmaceutics- physical pharmacy

**BP405** Pharmaceutical Technology of ayurvedic drugs-1

## **SEMESTER-V**

**BP501** Pharmaceutical Technology of ayurvedic drugs-2

**BP502** Drvya guna vigyan-3

**BP503** Pharmacognosy of ayurvedic drugs-2

**BP504** ras shastra

## **SEMESTER-VI**

**BP601** Bhaishjya kalpna

**BP602** Pharmaceutical Engineering

**BP603** pharmacology and toxicology of ayurvedic drugs-1

**BP604** Pharmaceutical analysis of ayurvedic drug-2

## **SEMESTER-VII**

**BP701** Ras Shastra

**BP702** Pharmacology and toxicology of ayurvedic drugs-2

**BP703** Pharmaceutical technology of Ayurvedic drug-3

## **SEMESTER-VIII**

**BP801** Bhaishjya kalpna

**BP802** Pharmaceutical analysis of ayurvedic drug-3

**BP803** Pharmaceutical Microbiology

**BP804** Forensic Pharmacy Acts Rules and Regulation and Pharmaceutical Management

## **Ayurveda Sharir Rachana Vigyan and anatomy –(BP101)**

- \* Shariropakrama :- Definition of Sharir and Shaarira, importance and utility of the knowledge of Sharira, (Rachana and Kriya), Shadangatwa of Shaarira, divisions of Sharir.
- \* 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).
- \*. Asthi sandhi & Peshi Sharir : - General concept of Asthi and Sandhi sharira, its numbers, types & functions.
- \* Koshtha and Ashaya Sharir :- General concept of Koshtha and Ashaya, its definition, number, formation and functioning
- \* Kala and Twak Sharir :- Definition, structure, types and functions.
- \*Elementary cell and tissues of the Body – Epithelial Tissues, Muscular Tissue, Nervous Tissue.
- \*Skeletal System.
- \* Cardiovascular system
- \*Digestive system
- \* Respiratory system
- \*Urinary System
- \*Reproductive system – Female Reproductive system, Male Reproductive system.

## **BP102 Ayurvedic sharir kriya and physiology**

- \*Dosha, dhatu mala moolam shariram.
- \* Vata names, location and function in health.
- \*. Pitta names, location and function in health.
- \*. Kapha names, location and function in health.
- \*. Sapta Dhatu, Updhatu and their nutrition from digested food.
- \*. Description of Hridayam according to Sustrut, its importance and functions in health
- \* Cardiovascular system
- \*Digestive system
- \* Respiratory system
- \*Urinary System
- \*Reproductive system – Female Reproductive system, Male Reproductive system.
- \*Blood-Composition of blood functions of blood elements, blood group and coagulation of blood. Brief information regarding disorders of blood.

## **BP103** Fundamentals of ayurveda

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, Kary 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
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.

# **BP104 Certificate programme in biology**

## **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) Malvaceae, (3) Leguminosae, (4) Papilionaceae, (5) Caesalpiniaceae, (6) Mimosaceae, (7) Umbelliferae, (8) Solanaceae (9) Euphorbiaceae, (10) Liliaceae 11 ) brassicaceae 12) curvitaceae 13) compositae

## **( 9 ) B. (Zoology)**

Disease causing parasites of protozoa and metazoa.

1. Protozoa – Brief Morphology & Lifecycle/Habitate/Distribution.
  - a. Malarial
  - b Trypanasoma.
2. Nematodes:
  - (a) Ascaris.
3. Filaria :-
  - (a) Lymphatic

**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.

## **WORKSHOP ON COMPUTERS FOR MANAGEMENT (BP-105)**

**Introduction to Computers:** Classification ,components of computer system.Introduction to High level and low level languages.Problem Analysis, flow charting and algorithm.

**Software:** system s/w, application s/w. Basic concepts of operating systems

**Tally:** Basics, Creating Companies, Various Accounts & Transactions, Ledgers, Balance Sheet, Ratio Analysis

Introduction to www, Internet and intranet, difference between Internet and intranet, sending and reading e-mails, fax.

Practical on Internet access to:

- Create E-mail address
- Perform transactions
- Send & receive messages
- Use of search engines

MS-Office 2000

**Word processing:** MS-Word, word basics, formatting text and documents, working with header and footer, footnotes, endnotes, tables and sorting, graphics, mail merge and macros.

Spreadsheets and their uses in business, Excel basics, rearranging worksheets, excel formatting techniques, using functions, chart features and working with graphics in excel.

**Power Point:** Basics, working with texts and graphics in Power Point.

Delivering information with Microsoft Mail.

## **BP201 Ayurvedic sharir rachana and anatomy**

- \* Indriya sharir:- Etymology, number, divisions of Jnanendriya and Karmendriya, general description about its Adhishthana and functions.
- \*. Garbh Sharir -shukra & artava's qualities qualifying them as pure & competent for conception and Masanumasika vikas of Garbh.
- \* Characteristics of presence of Atma in the body.
- \* 12 pranas, 10 Pranayatanani, 3- Pradhanmarmani, 15- Koshtangani.
- \*Skeletal muscles of the body.
- \* Central Nervous system.
- \*Lymphatic system
- \* Endocrine glands
- \*. Special sense – Taste, Smell, hearing and equilibrium, Sight, Touch, Pain.
- \* Concept of health.
- \*Nutrition and Health.

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

## **BP202 Ayurvedic sharir Kriya and physiology**

- \* Description of Yakrit, its importance and functions according to modern science.
- \* Definition, production, types, qualities, importance of Ojas.
- \*. Definition of Srotas, number, names and importance according to Charak.
- \*. The process of cognition – Jnamotpatti- according to Charak.
- \*Skeletal muscles of the body.
- \* Central Nervous system.
- \*Lymphatic system
- \* Endocrine glands
- \*. Special sense – Taste, Smell, hearing and equilibrium, Sight, Touch, Pain.
- \* Concept of health.

### **Practicals:**

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

## BP203 Dravya guna vigyan -1

- 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.

Introduction to some main and common karma (actions)

Deepana, Pachana, Grahi, Stambhana, Bhedana, Rechana, Anulomana, Samsana, 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.

- |                 |                  |                   |
|-----------------|------------------|-------------------|
| 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      |                   |
| 8. Bala         | 32. Chandana     | 55. Udumbara      |
| 9. Bilva        | 33. Katuka       |                   |
| 10. Bhringaraja | 34. Kantakari    | 56. Vansha        |
| 11. Dhatura     | 35. Latakaranja  |                   |
| 12. Ela         | 36. Varahikanda  | 57. Vacha         |
| 13. Gokshura    | 37. Khadira      |                   |
| 14. Guduchi     | 38. Nirgundi     | 58. Bibhitaki     |
| 15. Guggulu     | 39. Nimba        |                   |

16. Haritaki  
17. Haridra  
18. Jyotishmati  
19. Karavira  
20. Kapi kachchu  
21. Kutaja  
22. Karanja  
23. Kumari  
24. Plaksha

40. Maricha  
41. Manjishtha  
42. Parisha  
43. Punarnava  
44. Pippali  
45. Rohitaka  
46. Sariva  
47. Shirisha  
48. Shatavari

59. Vijayasara  
60. Vidanga  
61. Yashtimadhu  
62. Vidari  
63. Ashwattha  
64. Chandana  
65. Mustaka  
66. Prishniparni  
66. Prishniparni  
67. Chukra  
68. Choraka  
69. Dhataki  
70. Vata

**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.

## **BP204 Sanskrit**

### **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 (Karakas)

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 conjugation.

2. Verbs of fourth and sixth conjugation.

3. Vari, Madhu words in neutral gender and verbs of tenth conjugation.

4. 'Aavyaya' words and verbs of second conjugation.

**C.** Pronouns and Numeric.

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

## 2. Sanskrit Literature:

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

## BP205 Ras 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

Vidyadhar Yantra

Patan Yantra

Bhudhar Yantra

Khalva Yantra

Musa

Vajra

Vajra dravana

Rupyaa

Bida

Vrantaka

Malla

Gola

Manduka

Damaru Yantra

Swedan Yantra

Baluka Yantra

Patala Yantra

Kanduk Yantra

Vajra dravini

Varnya

Gara

Gostani

Pakva

Maha

Mushal

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

### Section –II (Bhaishajya Kalpana –)

- 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 matrix 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.

# Pharmaceutical Chemistry

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.

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. Empirical 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, racemic 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.

## **BP301 Ras shastra**

## **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

## BP302 Rog vigyan

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.

### BP303 Dravya Guna Vigyan -2

### • A Brief History of Dravya guna

Shastra.

- Concept of Rasa, Guna, Virya, Vipaka and Prabhava.
- The basis of nomenclature and Synonyms of Drugs.
- 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. Tugaraka     |
| 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

**BP304** seminar on executive communication

## BP401 Bhaishjya kalpna

Panca- Vidha Kashaya Kalpana –definition, 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 Sindoor, 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.

### BP402 Pharmacognosy of ayurvedic drugs-1

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 -

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, Katakari, Duralabha, Ingudi, Shatavari,  
Kakmachi. Cyanogenetic - Atasi, Padmakashta.

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

Coumarins - 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 Talisapatra.
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.

# BP403 Pharmaceutical analysis of ayurvedic drugs-1

## 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.

## ( 16Practicals :

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.

## **BP404 Pharmaceutics- physical pharmacy**

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. Refractive index determination, density determination, viscosity determination; use of screengauge, vernier caliper, hardness and disintegration of tablets and vials.

### **Practicals:**

1. Refractive index determination
2. Density determination
3. Physical Pharmacy - Mertin and others.
4. Remington's Pharmaceutical Sciences.
5. Text book of Physical Pharmaceutics - C.V.S. Subrahmanyam

## **BP405 Pharmaceutical Technology of ayurvedic drugs-1**

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 indffusable 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 :-** Practical related to above topics.

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

## **BP501 Pharmaceutical Technology of ayurvedic drugs-2**

1. Liquids (Solutions, syrups, elixirs, liquids for external use.) Definitions, general formulations, manufacturing procedures.
2. Pharmaceutical aerosols: Definitions, propellants, manufacturing and packaging methods.
3. Ophthalmic 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 Practical 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.

## **BP502 Drvya guna vigyan-3**

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.

( 19 ) (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

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2. Characteristic of Samanya pratyarabdha and Vichitra pratyarabdha Dravyas.
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8. The knowledge of following drugs regarding the classification, Latin name, Family, Synonyms, Botanical description, Varieties, Habitata, 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. Dugdhapeni      | 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

## BP503 Pharmacognosy of ayurvedic drugs-2

- 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, 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 Jyotishmati Taila.

Waxes - Madhuchishta (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.
16. Isolation of Xylem elements.

## **BP504 Ras Shastra**

- 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.

## BP601 Bhaishjya kalpna

- 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, 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		

## **BP602 Pharmaceutical Engineering**

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.

## **BP603 pharmacology and toxicology of ayurvedic drugs-1**

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, Pharmacotherapy of peptic ulcer.
14. Drug 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.

### **BP604 Pharmaceutical analysis of ayurvedic drug-2**

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.



## **BP701 Ras Shastra**

### **Section - I (Rasa Shastra -)**

- 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.  
Aragarbha.  
Kupipakva Rasasindur  
Gandhakdviguna  
Mallarsindoor  
Swarna vanga  
Rasakarpoor  
Khalaliya Tribhuvankirtirasa  
Ichchabhedirasa  
Navajivan Rasa

## **BP702 Pharmacology and toxicology of ayurvedic drugs-2**

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 arrhythmia.
  - 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) Pentylentetrazol 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.

## **BP703 Pharmaceutical technology of Ayurvedic drug-3**

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.

### **SEMESTER-VII**

## BP801 Bhaishjya kalpna

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, Pradhmana, Dhumapana, Nasal Preparations.

Basti Kalpanas - Different Basti Kalpanas & method of usage

Standardization of Bhaishjya formulations

Drug & Cosmetic Rule 1945.	Pathyadi Kwatha
Devadaryyadi Kwath	Manyisthadi Kwath
Phalatrikadi Kwath	Sitopaladi churna
Rasanasaptaka Kwatha	Gangadhara churna
Hinguvastaka Churna	Balachaturbhadra churna
Pushyanuag Churna	Abha Guggulu
Triphala Guggulu	Kaishor Guggulu
Yograja Guggulu	Agnitundi vati
Sinhanada Guggulu	Chitrakadi vati
Khadiradi vati	Rajhapravartini vati
Shankha vati	Vishgarbha tail
Jatyadi tail	Shadabindu tail
Panchaguna 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

## **BP802 Pharmaceutical analysis of ayurvedic drug-3**

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, Bpringer International 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.

## **BP803 Pharmaceutical Microbiology**

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, rickettsia spirochaetes and viruses.
4. Nutrition, cultivation, isolation and identification of bacteria, actinomycets, 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 attachment and host defence, Virulence and pathogenicity, primary and specific defensive mechanisms of body, infection and its transmission, interferons.

**( 28 ) 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.

# **BP804 Forensic Pharmacy Acts Rules and Regulation and Pharmaceutical Management**

## **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.

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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.