DELHI PHARMACEUTICAL SCIENCES AND RESEARCH UNIVERSITY

NEW DELHI

Syllabus

BACHELOR OF PHARMACY (AYURVEDA)

SCHEME OF TEACHING AND EXAMINATION

1. Minimum qualification for admission

The admission to B.Pharm (Ayu) program shall be as per rules and regulations of the University and in accordance with the guidelines issued by the State and Central government from time to time.

First year B. Pharm (Ayu):
Candidate shall have passed 10+2 examination conducted by the respective state/central government authorities recognized as equivalent to 10+2 examination by the Association of Indian Universities (AIU) with English as one of the subjects and Physics, Chemistry, Biology (P.C.B) and or Mathematics (P.C.M / P.C.M.B.) as optional subjects individually.

2. Duration of the program

The course of study for B. Pharm (Ayu) shall extend over a period of eight semesters (four academic years).

3. Medium of instruction and examinations

Medium of instruction and examination shall be in English.

4. Working days in each semester

Each semester shall consist of not less than 100 working days. The odd semesters shall be conducted from the month of June/July to November/December and the even semesters shall be conducted from December/January to May/June in every calendar year.

5. Attendance and progress

A candidate is required to put in at least 80% attendance in individual courses considering theory and practical separately. The candidate shall complete the prescribed course satisfactorily to be eligible to appear for the respective examinations.

6. Program/Course credit structure

As per the philosophy of Credit Based Semester System, certain quantum of academic work viz. theory classes, tutorial hours, practical classes, etc. are measured in terms of credits. On satisfactory completion of the courses, a candidate earns credits. The amount of credit associated with a course is dependent upon the number of hours of instruction per week in that course. Similarly, the credit associated with any of the other academic, co/extra-curricular activities is dependent upon the quantum of work expected to be put in for each of these activities per week.

6.1. Credit assignment

6.1.1. Theory and Laboratory courses

Courses are broadly classified as Theory and Practical. Theory courses consist of

lecture (L) and /or tutorial (T) hours, and Practical (P) courses consist of hours spent in the laboratory. Credits (C) for a course is dependent on the number of hours of instruction per week in that course, and is obtained by using a multiplier of one (1) for lecture and tutorial hours, and a multiplier of half (1/2)for practical (laboratory) hours. Thus, for example, a theory course having three lectures and one tutorial per week throughout the semester carries a credit of 4. Similarly, a practical having four laboratory hours per week throughout semester carries a credit of 2.

6.1.2. Minimum credit requirements

The minimum credit points required for award of a B. Pharm. (Ayu) degree is 259. These credits are divided into Theory courses, Tutorials, Practical, Elective subjects and Project over the duration of eight semesters. The credits are distributed semester-wise as shown in Table I. Courses generally progress in sequences, building competencies and their positioning indicates certain academic maturity on the part of the learners. Learners are expected to follow the semester-wise schedule of courses given in the syllabus.

Such students shall take up additional remedial courses of 'English/Business Communication' (Theory), 'Computer and its Applications in Pharmaceutical sciences' (Theory and Practical), 'Human values and professional ethics', Sanskrit (Theory).

7. Academic work

A regular record of attendance both in Theory and Practical shall be maintained by the teaching staff of respective courses.

8. Course of study

The course of study for B. Pharm (Ayu) shall include Semester Wise Theory & Practical as given in Table – IV to XI. The number of hours to be devoted to each theory, tutorial and practical course in any semester shall not be less than that shown in Table – IV to XI.

9. Examinations/Assessments

The scheme for internal assessment and end semester examinations is given in Table – I.

9.1. End semester examinations

The end semester examinations for each theory and practical course through semesters I to VIII shall be conducted by the university except for the subjects with asterix symbol(*) in table IV to XI for which examinations shall be conducted by the subject experts at collegelevel and the marks/grades shall be submitted to the university.

9.2. Schemes for Internal assessment and End semester examinations

Distribution of marks shall be as per the scheme given in Table I.

Table I: Scheme for distribution of marks

Examination	Internal Assessment				End Semester Assessment		Total Marks
	Continuous mode	Sessional Exams		Total			
		Marks	Duration		Marks	Duration	
University	10	15	1 hour	25	75	3 hours	100
Non-university	5	10	30 minutes	15	35	1.5 hours	50

9.3. Scheme for awarding internal assessment: Continuous mode

The marks allocated for Continuous mode of Internal Assessment shall be awarded as per the scheme in Table II.

Table II: Scheme for awarding continuous mode

Examination/Maximum Marks		
Criteria	**UE**	**NUE**
Attendance (Refer Table –1)	4	2
Academic activities (Average of any 3 activities e.g. quiz, assignment, openbook test, field work, group discussion and seminar)	3	1.5
Student – Teacher interaction	3	1.5
Total	**10**	**5**

UE= University Exam, NUE= Non-university Exam

Table III. Guidelines for the allotment of marks for attendance

Percentage of Attendance	University examination	Non-university examination
95 – 100	4	2
90 – 94	3	1.5
85 – 89	2	1
80 – 84	1	0.5
Less than 80	0	0

9.4. Sessional Exams

Two Sessional exams shall be conducted for each theory / practical course as per the schedule fixed by the college. The scheme of question paper for theory and practical Sessional examinations is given below. The average marks of two Sessional exams shall be computed for internal assessment as per the requirements given in tables – I.

Sessional exam shall be conducted for 15 marks for university examination subjects and 10 marks for non-university examination subjects.

9.4.1. Question paper pattern for theory Sessional examinations for subjects having Universityexamination

Multiple Choice Questions (MCQs)OR Objective Type Questions	=	5 x 1 = 05
(Answer all the questions)		
Long Answers (Answer 1 out of 2)	=	1 x 5 = 05
Short Answers (Answer 2 out of 3)	=	2 x 2.5 = 05
	Total	=15 marks

9.4.2. For subjects having Non-University examination

Short Answer questions(Answer all the questions)		=5x 1 = 05
Long Answers (Answer 2 out of 3)		=2 x 2.5 = 05
	Total	= 10 m arks

9.4.3. Question paper pattern for practical university examination

Synopsis	= 05
Experiments	= 15
Viva voce	= 5
	20 marks

10. Promotion and award of grades

A student shall be declared PASS and eligible for getting grade in a course of B. Pharm. (Ayu) program if he/she secures at least 50% marks in that particular course including internal assessment.

For example, to be declared as PASS and to get grade, the student has to secure a minimum of 50 marks for the total of 100 including continuous mode of assessment and end semester theory examination and has to secure a minimum of 25 marks for the total 50 including internal assessment and end semester practical examination.

11. Carry forward of marks

In case a student fails to secure the minimum 50% in any Theory or Practical course as specified in 10, then he/she shall reappear for the end semester examinationof that course. However his/her marks of the Internal Assessment shall be carried over and he/she shall be entitled for grade obtained by him/heron passing.

12. Improvement of internal assessment

A student shall have the opportunity to improve his/her performance only once in the Sessional exam component of the internal assessment. The re-conduct of the Sessional exam shall be completed before the commencement of next end semester theory examinations.

13. Re-examination of end semester examinations

Reexamination of end semester examination shall be conducted as per the format given in 9.4. The exact dates of examinations shall be notified from time to time.

Table IV: Course of study for semester I

Subject Code	Subject Title	Teaching hours/week			Credits	Examination			
						Internal Assessment		ESE	Total
		L	T	P		Continuous Mode	Sessional Exams		
BPA-101T	Fundamentals of Ayurveda including Swasthavritta	3	1	-	**4**	10	15	75	100
BPA-102T	Fundamentals of Anatomy and Physiology	3	1	-	**4**	10	15	75	100
BPA-103T	Fundamentals of DravyagunaVigyan-I	3	1	-	**4**	10	15	75	100
BPA-104T	Computer & its applications in pharmaceutical Sciences*	2	-	-	**2**	5	10	35	50
BPA-105T	Pharmaceutics-I (General and Dispensing Pharmacy)	3	1	-	**4**	10	15	75	100
HS-101T	Sankrit*	2	-	-	**2**	5	10	35	50
BPA-106P	Fundamentals of Anatomy and Physiology	-	-	3	**2**	5	20	75	100
BPA-107P	Fundamentals of DravyagunaVigyan-I	-	-	3	**2**	5	20	75	100
BPA-108P	Computer & its applications in pharmaceutical Sciences*	-	-	3	**2**	5	10	35	50
BPA-109P	Pharmaceutics-1	-	-	3	**2**	5	20	75	100
	Total =	**16**	**4**	**12**	**28**				**850**

ESE= End semester examination

Table V: Course of study for semester II

Subject Code	Subject Title	Teaching hours/week			Credits	Examination			
						Internal Assessment		ESE	Total
		L	T	P		Continuous Mode	Sessional Exams		
BPA-201T	Pharmaceutical Biology	3	1	-	**4**	10	15	75	100
BPA-202T	Fundamentals of Bhaishajya Kalpana-I	3	1	-	**4**	10	15	75	100
BPA-203T	Pharmacognosy & Phytochemistry-I	3	1	-	**4**	10	15	75	100
BPA-204T	Dravyaguna Vigyan–II	3	1	-	**4**	10	15	75	100
BPA-205T	Pharmaceutics-II (Physical Pharmacy)	3	1	-	**4**	10	15	75	100
HS-201T	English/Business communication*	2	-	-	**2**	5	10	35	50
BPA-206P	Pharmaceutical Biology	-	-	3	**2**	5	20	75	100
BPA-207P	Fundamentals of Bhaishajya Kalpana-I	-	-	3	**2**	5	20	75	100
BPA-208P	Pharmacognosy & Phytochemistry-I	-	-	3	**2**	5	20	75	100
BPA-209P	Dravyaguna Vigyan–II	-	-	3	**2**	5	20	75	100
BPA-210P	Pharmaceutics-II (Physical Pharmacy)	-	-	3	**2**	5	20	75	100
	Total =	**17**	**5**	**15**	**32**				**1150**

Table VI: Course of study for semester III

Subject Code	Subject Title	Teaching hours/ week			Credits	Examination			
						Internal Assessment		ESE	Total
		L	T	P		Continuous Mode	Sessional Exams		
BPA-301T	Dravyaguna Vigyan–III	3	1	-	**4**	10	15	75	100
BPA-302T	Pharmacognosy & Phytochemistry-II	3	1	-	**4**	10	15	75	100
BPA-303T	Pharmaceutical chemistry (Organic & Inorganic)	3	1	-	**4**	10	15	75	100
BPA-304T	Pharmacology-I	3	1	-	**4**	10	15	75	100
BPA-305T	Bhaishajya Kalpana-II	3	1	-	**4**	10	15	75	100
BPA-306T	Pathophysiology	3	1	-	**4**	10	15	75	100
BPA-307P	Dravyaguna Vigyan –III	-	-	3	**2**	5	10	75	100
BPA-308P	Pharmacognosy & Phytochemistry-II	-	-	3	**2**	5	10	75	100
BPA-309P	Pharmaceutical chemistry (Organic & Inorganic)	-	-	3	**2**	5	10	75	100
BPA-310P	Pharmacology-I	-	-	3	**2**	5	10	75	100
BPA-311P	Bhaishajya Kalpana-II	-	-	3	**2**	5	10	75	100
	Total =	**18**	**6**	**15**	**34**				**1100**

Table VII: Course of study for semester IV

Subject Code	Subject Title	Teaching hours/week			Credits	Examination			
						Internal Assessment		ESE	Total
		L	T	P		Continuous Mode	Sessional Exams		
BPA-401T	Pharmaceutical analysis of Ayurvedic Drugs-I	3	1	-	4	10	15	75	100
BPA-402T	Pharmacognosy & Phytochemistry-III	3	1	-	4	10	15	75	100
BPA-403T	Pharmaceutical Engineering	3	1	-	4	10	15	75	100
BPA-404T	Bhaishajya Kalpana-III	3	1	-	4	10	15	75	100
BPA-405T	DravyagunaVigyan-IV	3	1	-	4	10	15	75	100
BPA-406T	Pharmacology –II	3	1	-	4	10	15	75	100
HS-401T	Environmental Science*	2	-	-	2	5	10	35	50
BPA-407P	Pharmaceutical analysis of Ayurvedic Drugs-I	-	-	3	2	5	20	75	100
BPA-408P	Pharmacognosy & Phytochemistry-III	-	-	3	2	5	20	75	100
BPA-409P	Bhaishajya Kalpana-III	-	-	3	2	5	20	75	100
BPA-410P	DravyagunaVigyan–IV	-	-	3	2	5	20	75	100
BPA-411P	Pharmacology-II	-	-	3	2	5	20	75	100
	Total =	**20**	**6**	**15**	**36**				**1150**

Table VIII: Course of study for semester V

Subject Code	Subject Title	Teaching hours/week			Credits	Examination			
						Internal Assessment		ESE	Total
		L	T	P		Continuous Mode	Sessional Exams		
BPA-501T	Herbal Drug Technology	3	1	-	4	10	15	75	100
BPA-502T	Pharmaceutical Analysis of Ayurvedic Drugs-II	3	1	-	4	10	15	75	100
BPA-503T	Pharmaceutical Technology for Ayurvedic drugs-I	3	1	-	4	10	15	75	100
BPA-504T	Rasa Shastra-I	3	1	-	4	10	15	75	100
BPA- 505T	Bhaishajya Kalpana-IV	3	1		4	10	15	75	100
HS-501T	Disaster Management*	2	-	-	2	5	10	35	50
BPA-506P	Herbal Drug Technology		-	3	2	5	20	75	100
BPA-507P	Pharmaceutical Analysis of Ayurvedic Drugs-II	-	-	3	2	5	20	75	100
BPA-508P	Pharmaceutical Technology for Ayurvedic drugs-I	-	-	3	2	5	20	75	100
BPA-509P	Rasa Shastra-I	-	-	3	2	5	20	75	100
BPA-510P	Bhaishajya Kalpana-IV	-	-	3	2	5	20	75	100
	Total =	**17**	**5**	**15**	**32**				**1050**

Table IX: Course of study for semester VI

Subject Code	Subject Title	Teaching hours/week			Credits	Examination			
						Internal Assessment		ESE	Total
		L	T	P		Continuous Mode	Sessional Exams		
BPA-601T	Pharmacokinetics and Biopharmaceutics	3	1	-	**4**	10	15	75	100
BPA-602T	Pharmacology & Toxicology of Ayurvedic Drugs-I	3	1	-	**4**	10	15	75	100
BPA-603T	Rasa Shastra-II	3	1	-	**4**	10	15	75	100
BPA-604T	Pharmaceutical Technology for Ayurvedic Drugs-II	3	1	-	**4**	10	15	75	100
BPA-605T	Advanced Pharmacognosy	3	1	-	**4**	10	15	75	100
BPA-606T	Medicinal Chemistry	3	1	-	**4**	10	15	75	100
BPA-607P	Pharmaceutical Technology for Ayurvedic Drugs-II	-	-	3	**2**	5	20	75	100
BPA-608P	Advanced Pharmacognosy	-	-	3	**2**	5	20	75	100
BPA-609P	Rasa Shastra-II	-	-	3	**2**	5	20	75	100
	Industrial Training#	-	-	-	**-**	-	-	-	-
	Total =	**18**	**06**	**09**	**30**				**900**

#Industrial training: Every candidate shall be required to work for at least 1 month in an Ayurvedic/ Pharmaceutical Industry.It includesProduction unit, Quality Control department, Quality Assurance department, Analytical laboratory, Manufacturing unit, R&D, Ayurvedic Hospital,Clinical Research Organization, Community Pharmacy, etc. After the Semester – VI and before the commencement of Semester – VII, and shall submit satisfactory report of such work and certificate duly signed by the authority of training organization to the head of the institute.

Table X: Course of study for semester VII

Subject Code	Subject Title	Teaching hours/week			Credits	Examination			
						Internal Assessment		ESE	Total
		L	T	P		Continuous Mode	Sessional Exams		
BPA-701T	Pharmaceutical Jurisprudence & Pharmaceutical Management	3	1	-	**4**	10	15	75	100
BPA-702T	Pharmaceutical Microbiology	3	1	-	**4**	10	15	75	100
BPA-703T	Pharmacology & Toxicology of Ayurvedic Drugs-II	3	1	-	**4**	10	15	75	100
BPA-704T	Instrumental Methods of Analysis	3	1	-	**4**	10	15	75	100
BPA-705T	Rasa Shastra-III	3	1	-	**4**	10	15	75	100
HS-701T	Human values and Professional Ethics*	2			**2**	5	10	35	50
BPA-706P	Pharmaceutical Microbiology	-	-	3	**2**	10	15	75	100
BPA-707P	Rasa Shastra-III	-	-	3	**2**	10	15	75	100
BPA-708T Elective[@]	Biostatistics and Research Methodology (BPA-708A)/Pharmaceutical Regulatory Science (BPA-708B)/ Pharmacovigilance (BPA-708C)	3			**3**	10	15	75	100
	Industrial Training/Submission of report				**2**				100
	Hospital training**				**-**				-
	Total =	**20**	**05**	**06**	**31**				**950**

[@]Students have to choose one of the elective subject as per their interest.

**Hospital training: Every candidate shall be required to work for at least 15 days in an Ayurvedic/ Allopathic Hospital.It includes the various units of the hospital etc. after the Semester – VII and before the commencement of Semester – VIII, and shall submit satisfactory report ofsuch work and certificate duly signed by the authority of training organization to the head of the institute.

Table XI: Course of study for semester VIII

Subject Code	Subject Title	Teaching hours/week			Credits	Examination			
						Internal Assessment		ESE	Total
		L	T	P		Continuous Mode	Sessional Exams		
BPA-801T	Modern Analytical Techniques	3	1	-	**4**	10	15	75	100
BPA-802T	Rasa Shastra-IV	3	1	-	**4**	10	15	75	100
BPA-803T	Clinical Pharmacy	3	1	-	**4**	10	15	75	100
BPA-804T	Yoga	3	1	-	**4**	10	15	75	100
BPA-805T	Herbal Cosmetics	3	1	-	**4**	10	15	75	100
BPA-806T	Marketing Management	3	1	-	**4**	10	15	75	100
BPA-807P	Modern Analytical Techniques	-	-	3	**2**	5	20	75	100
BPA-808P	Rasa Shastra-IV	-	-	3	**2**	5	20	75	100
BPA-809P	Yoga	-	-	3	**2**	5	20	75	100
BPA-810P	Herbal Cosmetics	-	-	3	**2**	5	20	75	100
	Project Work[$]	-	-	-	**2**	-	-	-	100
	Hospital Trainning/ Report submission				**2**				100
	Total =	**18**	**6**	**12**	**36**				**1200**

[$]All the students shall undertake a project under the supervision of a teacher and submit a report. The project shall be carried out individualy or in group not exceeding 4 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages).

Table XII: Semester Vise Credits Assigned

S.NO.	SEMESTER	CREDITS ASSIGNED
1.	1st	28
2.	2nd	32
3.	3rd	34
4.	4th	36
5.	5th	32
6.	6th	30
7.	7th	31
8.	8th	36
	Total	**259**

SEMESTER-I

SEMESTER-I

BPA-101T FUNDAMENTALS OF AYURVEDA INCLUDING SWASTHAVRITTA

Unit I

Ayurveda Nirupana: Lakshana of Ayu, composition of Ayu Lakshana of Ayurveda. Lakshana and classification of Siddhanta. Introduction to basic principles of Ayurveda and their significance.

Introduction to Brihatrayi, Laghutrayi and their contribution in development of pharmaceutical science

Ayurveda Darshana Nirupana: Philosophical background of fundamentals of Ayurveda. Etymological derivation of the word "Darshana". Nyaya, Vaisheshika, Sankhya and Yoga. Ayurveda as unique and independent school of thought Padartha: Lakshana, enumeration and classification, Bhava and Abhavapadartha, Padartha according to Charaka (Karana-Padartha).

Unit II

Dravya Vigyaniyam Dravya: Lakshana, classification and enumeration.

Panchabhuta: Brief introduction of panch mahabhoot and lakshan and qualities of each bhoota.

Kaala: Etymological derivation, Lakshana and division /units, significance in Ayurveda.

Dik: Lakshana and division, significance in Ayurveda.

Atma: Lakshana, classification, seat, Gunas, Linga according to Charaka, the method/process of knowledgeformation.

Purusha: As mentioned in Ayurveda-Ativahikapurusha/Sukshmasharira/Rashipurusha/Chikitsapurusha/ Karmapurusha/Shaddhatvat makapurusha.

Manas: Lakshana, synonyms, qualities, objects, functions, dual nature of mind (*ubhayaatmakatvam*), as a substratum of diseases, penta-elemental nature (*panchabhutatmakatvam*). Role of Panchamahabhuta and Trigunain Dehaprakriti and Manasaprakriti respectively.

Examination

Ten points for examination i.e. Kaarana, karana, karya, karyayoni, karyaphala, Anubandha, Desha, kala,Prakritiand Upaya and their utility and application in Pharmacy.

Introduction and utility of Pramana - Pratyaksha, Anuman, Aaptopadesh and Yukti.

Unit III

Swasthvritta prayojna, *Swastha* lakshana, Swasthvritta, Dincharya, Ratrichrya, Rituchrya; sanchya, prakopa, prashamna of dosha accordinding to ritu; ritusandhi. Traupastambha; Importance of aahar, nidra and brahmacharya. Importance of shuddh vayu, jala, desha and kala.

Unit IV

Mansik sadvritta, samajik aswasthavritta, dharmik swasthavritta, dharniya and adharniya vega, sanshodhan and sanshamna, Rasayana and vajikarna. Communicable diseases, respiratory diseases such as tuberculosis, whooping cough, influenza, mumps etc.Intestinal infection such as Cholera, hepatitis, Typhoid etc. arthropod, borne diseases such as Dengue, malaria etc. Immunization: National immunization schedule and WHO EPI immunization schedule.

Text Books:

1. Dr. Ram Harsh Singh. Swasthvritta Vigyan Chaukhamba Prakashan, New Delhi, Varanasi.
2. Dr. Kashinath Samgandhi Swasthvritta Suddha Chaukhamba Prakashan, New Delhi, Varanasi.

Reference Books:

1. Charak Sahimta, Chaukhamba Prakashan, New Delhi, Varanasi.
2. Sushrat Sahimta, Meharch and Laksham and as Prakashan, New Delhi.

BPA-102T FUNDAMENTALS OF ANATOMY AND PHYSIOLOGY

FUNDAMENTALS OF PHYSIOLOGY

Unit I

a) Basic Tissues

Function of epithelial, connective, muscular and nervous, muscle contraction and properties. Nerve impulse generation and transmission including introductory knowledge of Dosha, Dhatu and Mal with their types and properties.

b) Body Systems

Respiratory system: Respiratory volumes and capacities, ventilation, compliance and resistance, gaseous exchange and transport in blood, nervous and chemical regulations of respirations.

Renal system: Kidney and urinary tracts, nephron transport processes, concentration and dilution of urine, plasma clearances. Micturition.

Unit II

Blood and cardiovascular systems including Digestive system: Body fluids, roles of blood cellular components and plasma proteins, coagulation, blood groups, blood disorders,"Circulation"cardiac cycle, impulse generation and transmission, electrocardiogram, haemodynamics, capillary circulation, Detail concepts of Doshas, Dhatuandmal, prakritiprikshan and dhatuposhannyaya.

Ayurvedic concept of Ojus and vyadhikshamatva.

Digestive system: Nutritional and Vitamin requirements, vitamin deficiencies, structure of alimentarycanal, structure and functions of liver. Detailed concept of Agni. Classification and importance. Ayurvedic and modern concept of digestion and metabolism.

FUNDAMENTALS OF ANATOMY

Unit III-Introduction and Scope

Introductory knowledge of Anatomy.

Scope & Terminology of Anatomy with concept of shadang sharira.

Elementary cell and tissues of the Body-Epithelial Tissues, Muscular Tissues, Nervous Tissue.

Unit IV

Skeletal muscles of the body. Nine regions of the abdomen and organs situated in these regions & basic anatomy of the organs e.g. Liver, kidney, lungs, heart, pancreas, stomach.

Introductory knowledge of Ayurvedic description of Asthisandhi, Snayuand Kandara.

General introduction to male and female reproductive system with concept of Shukra, Aartav and Garbhavkranti.

Introduction to nervous system and special senses with Ayurvedic view of Gyanendriya.

Text Books:

1. A.C. Guyton & J.E. Hall, Text book of Medical Physiology published in India by PrismBooks Ltd. onarrangementwith W.B.Saunders Company, U.S.A., U.S.A., Ninth Edition, 1996.

2. C.A.Keele, E.Neil and N.Joels, Samson Wright's Applied physiology, Thirteenth Edition, published by Oxford University Press,1982.

3. Cunningham's Textbook of Anatomy, edited by G.J. Romanes, Eleventh Edition, publishedby Oxford University Press, 1972.

Reference Books:

1. W.F. Ganong, Review of Medical Physiology, Thirteenth Edition, published by Appleton& Lange, U.S.A.,1987.

2. A.J.Vander, J.H.Sherman and D.S.Luciano, Human Physiology.

3. Ross and Wilson. Anatomy and Physiology in Health and Illness. Sydney: Churchill Livingstone.

4. Relative portions of Sushruta Samhita.

BPA-103T FUNDAMENTALS OF DRAVYAGUNA VIGYANA–I

Unit I

Definition & importance of Dravyaguna vigyana

Saptapadartha of Dravyguna- Vigyana viz. Dravya, Rasa, Guna, Veerya, Vipaka, Prabhava and Karma
Dravya - Definition, panchabhautic composition, properties and its importance
Classification of Dravya:
A) According to Ayurvedic Principles:
(a) Karya-Karan bheda (b) Chetan-Achetan bheda (c) Panchbhautik composition (d) Yoni bheda (e) Prayoga bheda (f) Rasa bheda (g) Veerya bheda (h) Vipak bheda (i) Doshkarma bheda
B) Classification of Ahara & Aushadha dravyas according to Charaka Samhita, Sushruta Samhita & Bhavaprakash.

Unit II

Concept of Rasapanchaka:

A) Rasa- Definition, Types, Panchbhautic composition, properties, action on dosha, dhatu & mala.
B) Guna- Definition, classification of Guna, Panchmahabhautic composition of Sharira Guna, its properties and action on Dosha, Dhatu and Mala.
C) Veerya – Definition, concept of veerya, Enumeration of veerya, Properties, Action on Dosha, Dhatu and Mala.
D) Vipaka–Definition, Types, Properties and action on Dosha, Dhatu and Mala.
E) Prabhava–Definition, concept of Prabhava, action of Prabhava and importance of prabhava.
Definition and concept of samanpratyarabdha and vichitrapratyarabdha.

Unit III

Definition, description and understanding of following karma with examples:

Deepan, Pachan, Grahi, Stambhan, Bhedan, Rechan, Anuloman, Sransan, Sanshodhan, Rasayana, Vajikaran, Vyavayi, Madkari, Vikasi, Swedana, Swedopaga, Snehana, Snehopaga, Vamana, Vamanopaga, Virechana, Virechanopaga

Unit IV

Various impurities of drugs and their methods of purification:
1) Guggulu 2) Hingu

Detailed knowledge of following drugs with respect to Basonym of drug, Main Synonyms, Regional Name, Botanical Name, Family, classification of Dravya (Gana) as described in Charak, Sushrut and Bhavaprakashai. e. Habit and habitat/varieties, External morphology, Useful parts, Important phyto constituents, Rasa panchaka, Action on Dosha, Dhatu, Mala, Therapeutic indications, Amayikaprayoga and Matra (Therapeutic administration and Dose), Name of important formulations, Adverse effects, remedial measures and Shodhana (as required)
1. Ahiphena 2. Agnimantha 3. Agaru 4. Amalaki 5. Apamarga 6. Aragvadha 7. Ardraka-sunti 8. Arjuna 9. Arka 10. Ashvagandha 11. Ashvagola 12. Asoka 13. Ativisha 14. Bakuchi 15. Baladvayam. 16. Bharangi 17. Bhallataka 18. Bibhitaka 19. Bijaka/Vijayasara 20. Bilva 21.Brahmi 22. Bhrungaraj 23. Bruhati 24. Chandanadvaya, 25. Chitraka 26. Dadima 27.Danti 28. Daruharidra 29. Dhanyaka 30. Dhataki

Text Books:

1. Dravyaguna vijana; by Dr. Mansi Desh Pandey, Chaukhamba Sanskrit Pratisnthana, NewDelhi.
2. Dravyaguna vijana Vol 1-5 by Prof. Sharma P.V; published by Chaukhambha Bharti Academy,Varanasi.

Reference Books:

1. The Wealth of India Publication and Directorate (CSIR, New Delhi)
2. Data base on medicinal plants used in Ayurveda by CCRAS, New Delhi.
3. Indian Medicinal Plants by K.R. Kirtikar and B.D.Basu

BPA-104T COMPUTER AND ITS APPLICATIONS IN PHARMACEUTICAL SCIENCES

Unit-I

a) Fundamentals of Computer: Introduction to computers, Characteristics of computers, Historical perspective of computers, Computer generations, Types of computers and uses, Software and Hardware, Basic organization of a computer system and functions performed by each unit. Various Input deviceslike Keyboard, Mouse, Joy stick, Electronic pen, Track ball etc. and output devices Printers, Monitors. Memory storage: Memory Cells, Semi conductor and Magnetic core memory, ROM and its types, RAM Cache and Virtual Memory. Secondary Storage devices and their organization (Hard disk, Floppy disk,CD and DVD).

b) Operating System: Definition, Need and organization of OS, Functions performed by operating system. Type of Operating System. DOS, windows, Directories and files. Commands (internal & external). Icons, Clipboard. Folders, Major differences between a DOS and Windows.

Unit II

a) Data Communication and Networks: Basic elements of a commutation system, Data transmission mode, Network Topologies (ring, star, fully connected and Bus), LAN and WAN, Bounded and unbounded communication media.

b) Internet Technology: Internet, Services provided by internet, Potential uses and abuses of internet, working of search engine, Effective use of social media sites. Concept and implementation of E-Services (Digital India)

Unit III

a) Computer Virus: Definition, Causes and symptoms of virus, Types of viruses, Detections, prevention and cure against viruses using antivirus software packages.

b) Role of Computers in Pharmacy: Use of computer in various pharmaceutical and clinical applications like drug information services hospital and community pharmacy, drug design, pharmacokinetics and data analysis.

Unit IV

Ms Office Package:

a) Word Processing Package: Features and uses of MS-Word processing, File handling (opening, creating, saving printing and editing), Formatting, Printing setups, Table Handling, Mail Marge, Spell check, file protection etc. in MS-Word.

b) Spread sheet Package: Basics of spread sheet, feature and uses of Excel, Worksheet, formatting Sheets,Data (Sort and Filter), Calculation and graphing using formulae and function,
Goal seek, scenario.

c) Presentation Package: Introduction to powerpoint, features and uses of PowerPoint, creating a new presentation, editing and formatting, working with slides in different views, Animation, Transitions, Action buttons, Macros, Insert (text, slide, picture).

Reference Book

1. Sinha PK, Sinha P. Computer Fundamentals. New Delhi: BPB Publications.
2. Rajaraman V. Fundamental of Computers. New Delhi: Prentice Hall (India).

BPA-105T PHARMACEUTICS-I (GENERAL AND DISPENSING PHARMACY)

Unit I

Introduction and Scope of the Profession and Metrology:

Introduction and scope of pharmacy profession, official compendia and its uses in pharmacy profession. Introduction to units of weights and volume in metric systems, imperial systems and SI system. Simple calculation involved in preparing solutions of solids in liquids (W/V), liquids in liquids (V/V), Method of allegation.

Unit-II

Monophasic Liquid Dosages Formulations:

Formulation, characteristics, manufacturing procedure including examples of internal and external monophasic dosages form. Official pharmaceutical solutions, products for oral and topical use including mixture, syrups, elixirs, mouth washes, gargles, throat paints, aromaticwaters, lotions and liniments, Douches, nasal and ear drops. Evaluation of monophasic liquid dosage formulations.

Unit III

Powder dosage forms:

Official standards for powders as per IP/API, sieves and their usage in grading, bulk powders for internal and external use. Dusting powders, insufflations, single dose powders, effervescent powders, hygroscopic powders, efflorecent powders, eutectic mixture and granules. Evaluation of powder dosage form.

Unit IV

a) Prescription

Description and parts of a prescription, handling the prescription, reading the prescription, checkingthe written prescription, compounding the prescription.

b) Incompatibilities

Classification, Types and examples of Physical incompatibilities, Chemical incompatibilities and Therapeutic Incompatibilities.

Text Books:

Recent editions of the following books to be referred

1. L.Lachman, H.A.Lieberman and J.L.Kanig, The Theory and Practice of Industrial Pharmacy, Lea and Febiger, Philadelphia, U.S.A.

2. N.K. Jain, Vallabh Prakashan, Textbook of General & Dispensing Pharmacy, Edn. 2012, India.

ReferenceBooks:

1. Indian Pharmacopoeia 2007. New Delhi:Indian Pharmacopoeia Commission
2. Remington, The Science and Practice of Pharmacy, Mack Publishing Co.,U.S.A.
3. S.J. Carter, Dispensing for Pharmaceutical Students, 11^{th} and 12^{th} edition, 1967 and 1975, Pitman Books Ltd., London, U.K.

HS- 101T SANSKRIT

Section I: Grammar

A.

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

B.

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

C.

Pronouns and Numeric.

D.

Consonant ending words and fifth and eight conjugation.

Section II: Sanskrit Literature

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

Reference books

1. Laghu Sidhanta kaumudi
2. Anuvada Chandrika
3. Hitopadesh (Author: Narayana Pandit)

BPA-106P: FUNDAMENTALS OF ANATOMY AND PHYSIOLOGY

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

List of experiments:

1. Introductory study of human skeleton.
2. Study of humerus, tibia, fibula, scapula, vertebra.
3. Study of different systems with the help of charts and models.
4. Study of preserved human organs.
5. Recording of body temperature, pulse rate and blood pressure.
6. Physico-chemical parameters of Urine.
7. Determination of Blood grouping.
8. Determination of Bleeding time.
9. Determination of Clotting time.
10. Estimation of Haemoglobin.
11. Demonstration of E.S.R.
12. Demonstration of E.C.G.

TextBooks:

1. Gray's Anatomy, edited by P.L. Williams & R. Warwick, 38th Edition, publishedby Churchill Livingstone, 1995.
2. Cunningham's Textbook of Anatomy, edited by G.J. Romanes, Eleventh Edition andpublished by Oxford University Press, 1972.

ReferenceBooks:

1. Tortora GJ, Derrickson B. Principles of Anatomy and Physiology. New York: John Wiley& Sons.
2. Ross and Wilson. Anatomy and Physiology in Health and Illness. Sydney: ChurchillLivingstone.
3. Guyton AC, Hall JE.Textbook of Medical Physiology. NewYork: WB Sanders Co.

BPA-107P FUNDAMENTALS OF DRAVYAGUNA VIGYANA – I

Note: Practical's as per topics in the syllabus mentioned

1. Knowledge of market sample and price of dravya.
2. Drug tour/field visit.
3. Description and identification of drugs mentioned in theory.
4. Genuineness test of following substances: Guggulu and Hingu.
5. Prepare any 30 herbarium sheets of drugs mentioned in theory syllabus.

Text Books:

1. Dravyagunavijana; by Dr. Mansi Deshpandey, Chaukhamba Sanskrit Pratisnthana, NewDelhi.
2. Dravyagunavijana Vol1-5 by Prof. Sharma P.V; published by Chaukhambha BhartiAcademy,Varanasi.

ReferenceBooks:

1. The Wealth of India Publication and Directorate (CSIR, New Delhi)
2. Database on medicinal plants used in Ayurveda by CCRAS, NewDelhi.
3. Indian Medicinal Plants by K.R. Kirtikar and B.D.Basu

BPA-108P: COMPUTER AND ITS APPLICATIONS IN PHARMACEUTICAL SCIENCES

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 8/10 experiments must be performed by a student during the semester.

List of Practicals:

1. Basic exercises of MSWord
2. Basic exercises of Excel
3. Basic exercises of Internet
4. Basic exercises of Power Point presentation
5. Basic exercises of spreadsheets
6. Basic exercises of Email
7. Basic exercises of searching databases related to Ayurvedic Pharmacy
8. Basic exercises of Paint
9. Basic exercises of preparing Pdf files
10. Basic exercises of converting doc files into one another

TextBooks:

1. Sinha PK, Sinha P.Computer Fundamentals.New Delhi:BPB Publications.
2. RajaramanV. Fundamental of Computers. New Delhi: Prentice Hall (India).

BPA-109P: PHARMACEUTICS-1

Note:

Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 8/10 experiments must be performed by a student during the semester.

List of Practicals

1. To prepare and dispense syrup according to IP 1966
2. To prepare and dispense paracetamol pediatric elixir
3. To prepare and dispense iodine throat paint (Mandles paint)
4. To prepare and dispense cresol with soap solution
5. To prepare and dispense Lugol's solution
6. To prepare and dispense calamine lotion.
7. To prepare and dispense aluminium hydroxide gel.
9. To prepare and dispense effervescent granules.
10. To prepare and dispense dusting powder.
11. To prepare and dispense chlorhexidine mouthwash.
12. To prepare and dispense methyl salicylate ointment.

Textbooks: (Latest Editions)

1. H.C. Ansel et al., Pharmaceutical Dosage Form and Drug Delivery System, LippincottWilliams and Walkins, New Delhi.
2. Carter S.J., Cooper and Gunn's-Dispensing for Pharmaceutical Students, CBS publishers,New Delhi.
3. M.E. Aulton, Pharmaceutics, The Science & Dosage Form Design, Churchill Livingstone,Edinburgh.
4. Indian pharmacopoeia.
5. British pharmacopoeia.
6. Lachmann. Theory and Practice of Industrial Pharmacy, Lea & Febiger Publisher, The Universityof Michigan.
7. Alfonso R. Gennaro Remington. The Science and Practice of Pharmacy, LippincottWilliams,New Delhi.
8. Carter S.J., Cooper and Gunn's. Tutorial Pharmacy, CBS Publications, New Delhi.
9. E.A. Rawlins, Bentley's Text Book of Pharmaceutics, English Language Book Society,Elsevier Health Sciences, USA.
10. Isaac Ghebre Sellassie: Pharmaceutical Pelletization Technology, Marcel Dekker, INC,New York.
11. Dilip M. Parikh: Handbook of Pharmaceutical Granulation Technology, Marcel Dekker, INC, New York.
12. Francoise Nieloud and Gilberte Marti-Mestres: Pharmaceutical Emulsions andSuspensions, Marcel Dekker, INC, New York.

SEMESTER-II

BPA-201T PHARMACEUTICAL BIOLOGY

Unit-I

Structure of typical plant cell and its important inclusions including mitochondria, ribosomes, chloroplast, neucleus, endoplasmic reticulum, glogi apparatus, cytoplasm etc. Structure and functions of some important plant tissues like parenchyma, xylem, sclerenchyma, phloem etc.

Unit-II

General morphology of plants with special reference to external features of flowers (types of flowers-unisexual, bisexual, hermaphrodite and inflorescence), fruit and its types, seeds (monocot and dicot), barks, roots (tap root and adventitious root system), woods (hard and soft woods) and leaves(apexes, margins, venations, types)

Unit-III

Principles of classification of plants with special reference to the plants of the following families. Studies of chemical constituents and medicinal value of Rutaceae, Leguminosae, Umbelliferae, Apocynaceae, Solanaceae, Convolvulaceae, Euphorbiaceae, Liliaceae, Zingiberaceae.

Unit –IV

Definition of the crude, organized and unorganized drugs, Classification of the crude drugs including Alphabetical, morphological, microscopical, chemical etc. Methods of systematic studies of the crudedrugs, Cultivation methods, collection and storage of crude drugs.

Text Books:

1. A text book of *'Pharmacognosy '*by R.K.Parmar,Vol. I, Ed.-I, P.Prakashan,India.
2. Kokate CK, Gokhale SB, Purohit AP: *Parmacognosy* 36thedn. Nirali Prakashan, Pune, India.
3. S.S Handa. Textbook of Pharmacognosy Vallabh Publications, New Delhi.

Reference Books:

1. Evans WC (2002): *Trease and Evan's Pharmacognosy*. 15th edn., Saunder' Elsevier Pvt. Ltd. New Delhi-24,India.
2. Arya V, Kaur R. *Kangrian Medicinal Flora*. 1st edn. Pranav Prakashan, Kangra, H.P., India.
3. Khandelwal KR (2006): *Practical Pharmacognosy* Techniques and Experiments 16thEdn. Nirali Prakashan,Pune, India.

BPA-202T FUNDAMENTALS OF BHAISHAJYA KALPANA-I

Unit-I

History of Bhaishajya Kalpana and its gradual development

Bhaishajya kalpana utpatti, Bheshaja, Aushadham, Kalpana, Qualitative and quantitative aspects of Aushadha Kalpana, Basic fundamentals of processing techniques, Yogas (compound formulation) and benefits of drug combination, Synergism, Potentiation, Pharmaceutical processes of Ayurveda, Bhaishajya Kalpana sankshipta itihasa and Kramika Vikasa.

Unit-II

Adharabhuta siddhanta of Bhaishajya Kalpana-A

Paribhasha (Glossary of Technical Terms): Lavana panchaka, Lavana traya, Triphala, Trikatu, Ksharadravya, Ksharatraya, Ksharapanchaka, Ksharaashataka, Mutrastaka, Amlavarga Amlapanchaka, Panchtikta, Panchmrittika, Madhuratraya, Panchamrita, Panchgavya, Kshiratraya, Dudghavarga, Tailavarga.

Unit-III

Adharabhutasiddhanta of Bhaishajya Kalpana-B

Anuktadravyagrahana, selection of drugs, drugs to be used in wet-form, general rule, vishesokta dravyagrahana, form of ausadha kalpana, naming a recipe, importance of Rasa, Guna, Virya, Vipaka, Karma and Prabhava, bhaishajyamarga, matra, posology, anupana, aushadhasevenakala (time of drug administration), kalpana and their saviryataavadhi (formulae and their expiry dates), aushadhasamrakshanavidhi (guidelines for the storage of medicines), antioxidants and preservatives.

Unit-IV

Ausadhanirmanashala (Rasashala) and brief introduction of Yantra

Rasashala, plan of pharmacy, section wise description of yantra (machines) mentioned in differentprescribed sections in GMP, dolayantra, patalayantara, khalvayantra, saravasamputa importance of size reduction, mechanisms of grinding machines, disintegrator, cutter mill, roller mill, hammer mill, end runner mill, capsule filling machine, automatic capsule filling machine, rotary tablet machine, coating pan, Monsanto hardness tester, tablet disintegration test apparatus, simple distillation apparatus, hot air oven.

Concept of aushadhinirmanshala with respect of GMP in accordance to schedule T.

Text Books:

1. Textbook of Bhaishajya Kalpana Vigyana by Dr. Dr. G. Prabhakar Rao, ChaukhambaPublication, New Delhi
2. Textbook of Bhaishajya Kalpana Vigyana by Dr. Siddhinandana Mishra, ChaukhambaSanskrit Bhawan, Varanasi.
3. Textbook of Bhaishajya Kalpana Vigyana by Dr.Santosh Kumar Mishra, ChakhambhaOrientalia, Varanasi.

Reference Books:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I&II, Govt. of India Publication.
3. The Ayurvedic Pharmacopoeia of India Part-II, Govt. of India Publication.
4. Bhaishajya Ratnawali, Krishnadan Academy, Varanasi
5. Ayurved SaraSangraha.
6. Rasa Tantra Saraavum Siddha Prayog Sangraha, SriKrishan Gopal Bhawan Kaleda, Rajasthan.

BPA-203T PHARMACOGNOSY & PHYTOCHEMISTRY-I

Unit -I

Introduction to Pharmacognosy and Plant microscopy

Introduction, development, present status and future scope of Pharmacognosy. Techniques in microscopy covering use of mountants (water and glycerine), clearing agents (chloral hydrate), chemomicroscopic reagents(stains), micrometer, quantitative microscopy.

Unit –II

Introduction to plant metabolites

Definitions of selected botanical terms related to groups of plant constituents: Carbohydrates, glycosides, tannins, lipids, volatile oils, terpenes, resins combinations, alkaloids, flavonoids, anthraquinones, coumarins, saponins, gums and mucilage's.

Unit–III Sources of drugs

Terrestrial, Marine and Microbial and a brief introduction of following groups with biological source, chemical constituents and uses of the drugs listed:

Thallophytes:

(a) Algae-Diatoms, Agar and Alginic Acid.

(b) Fungi-Ergot, Yeast and Mushrooms.

Pteridophytes: Malefern

Unit-IV

Spermatophytes:

(a)Gymnosperms–Medicinal importance of family *Pinaceae*.

(c) Angiosperms–Covering important medicinal plants of families with special reference to their biological source, major chemical constituents and uses: Apocynaceae, Compositae, Labiatae, Convolvulaceae, Liliaceae, Leguminosae, Papaveraceae, Rubiaceae, Rutaceae Solanaceae, Scrophulariaceae and Umbelliferae.

Unit V

a). **Study of cultivation, collection, substitutes, adulterants, diagnostic macroscopic and microscopic features and phytochemical tests for identity of drugs** –Glycyrrhiza, Digitalis, Aloe, Senna and Datura.

b). **Study of botanical sources including alternative names, chemical constituents and therapeutic uses of the following indigenous traditional drugs**: Amla, Behera, Harad,Ashwagandha, Babchi, Brahmi, Vasaka, Bach, Tulsi, Shatavar, Shankhpushpi, Kutaki, Kalmegh, Gokhru, Chirata, Ashoka, Jatamansi, Kuthand Gilo.

c). Good agricultural practices in cultivation of medicinal plants including Organic farming. Pestand Pest management in medicinal plants: Biopesticides/Bioinsecticides.

Text Books:

1. A textbook of*'Pharmacognosy'* by R.K.Parmar, Vol.I, Edn.-I, P.Prakashan, India.
2. Kokate CK, Gokhale SB, Purohit AP: *Parmacognosy* 36thedn. Nirali Prakashan, Pune, India.
3. S.S. Handa Textbook of Pharmacognosy Vallabh Publications, New Delhi.

Reference Books:

1. Evans WC (2002): Trease and Evan's Pharmacognosy. 15th edn., Saunder' Elsevier Pvt Ltd. New Delhi-24,India.
2. Quality Standards of Indian Medicinal Plants. New Delhi: ICMR.
3. Medicinal Plants of India. New Delhi: ICMR.

BPA-204T DRAVYAGUNA VIGYANA II

Unit-I

Basis of nomenclature of dravya, Basis and Derivation of synonyms. Ecology-Classification of geographical area (desha) and soil (bhumi), collection of dravya, Nature and quality of drug to be collected (swarupa of sangrahya dravya), Method of collection (Sangrahana vidhi), -Vegetable and Animal drugs according to part used. Period of collection according to virya, preservation of collected dravyas and its savirytaavadhi, Store house (bheshajagara).

Unit-II

Ideal drug (Prashastabheshaja), Use of different parts of medicinal plants (bheshaja prayoga, rayojyanga), Incompatibility (knowledge of viruddhatwa), principles of preparation of Aushadha yoga,Consideration of vaya, bala, linga, agni, dosha, dushya, vyadhi, koshta, dehaprakriti, Abhyasa, satwa, deshakaal and kalpana for deciding dosage of drugs (Matranishchiti).

Concept of Dravyasyakarmukatvam (Mode of action) & Aushadhayogasyakarmukatvam (Mode of action of classical formulations) according to Ayurveda. Anupanavy avastha, time of administration (Bheshajasevanakaal), routes of drug administration (Bheshaja prayoga marga)

Unit III

Description regarding following nighantus including primary introduction, author, period, classification & its specialty.

a) Dhanwantari nighantu b) Madanpala nighantu c) Kaideva nighantu d) Bhavprakash nighantu e) Raj nighantu.

Unit-IV

Detailed knowledge of following drugs with respect to Basonym of drug, Main Synonyms, Regional Name, Botanical Name, Family, classification of Dravya (Gana) as described in Charak, Sushrut and Bhavaprakasha i.e. Habit and habitat/varieties, External morphology, Useful parts, Important phyto constituents, Rasa panchaka, Action on Dosha, Dhatu, Mala, Therapeutic indications, Amayikapra yoga and Matra (Therapeutic administration and Dose), Name of important formulations, Adverse effects, remedial measures and Shodhana (as required)

1. Draksha 2. Durva 3. Ela 4. Eranda 5. Gambhari 6. Gokshura 7. Guduchi 8. Guggulu 9. Haridra 10. Haritaki 11. Agastya 12. Akarakarabha 13. Ajamoda 14. Amra 15. Amragandhiharidra 16. Ankola 17. Aparajita 18. Ashvatha 19. Asthishrunkhala 20. Avartaki 21. Babbula 22. Badara 23. Bakula 24. Bhumyamalki 25. Bimbi 26. Bijapoora 27. Bola 28. Chandrashura 29. Changeri 30. Vrukshamla 31.Koshataki 32.Kokilaksha 33.Kumuda 34.Kusha 35.Lajjalu 36.Langali 37.Latakaranja 38.Latakasturi 39.Madayantika 40. Mahanimba 41.Mandukaparni 42.Mashaparni 43.Mayaphala 44.Methika 45.Meshashrungi 46.Mudgaparni 47.Mulaka 48. Nagabala 49. Nala 50.Narikela

TextBooks

1. Dravyaguna vigyana by Dr. Mansi Deshpandey, Chaukhamba Sanskrit Pratisnthana,New Delhi.
2. Dravyaguna vigyanaVol 1-5 by Prof. Sharma P.V; published by Chaukhambha BhartiAcademy,Varanasi.

ReferenceBooks

1. The Wealth of India Publication and Directorate (CSIR, New Delhi).
2. Database on medicinal plants used in Ayurveda by CCRAS, New Delhi.
3. Indian Medicinal Plants by K.R. Kirtikar and B.D. Basu.
4. The Ayurvedic Pharmacopoeia of India, Govt of India Publication.
5. Aushadhnaamrupa Vigyanam by Dr. Sanjeev Kumar lale, published by Hemraj lale Indore.

BPA-205T PHARMACEUTICS-II (PHYSICAL PHARMACY)

Unit-I

a) Introduction of following topics

Refractive index, density: bulk density, tapped density, angle of repose, use of screw gauge, vernier caliper and hardness tester for determination of tablet, vatti and guttica thickness and hardness.

b) Drug Stability: Physical degradation of drugs, chemical decomposition of drugs, Stability testing of dosage forms, storage methods and storage conditions.

Unit-II

Surface and Interfacial Phenomenon

Liquid interface, surface and interfacial tensions, capillary rise methods, surface free energy, spreading coefficient, wetting phenomena, contact angle, critical surface tension, detergency, surface active agents.

HLB: Hydrophilic Lipophilic balance: concept, application of HLB, required HLB.

Unit-III

Viscosity and Rheology

Concept of viscosity, Newtonian systems, Law of flow, factors affecting viscosity, Non- Newtonian systems, plastic flow, pseudoplastic flow, dilatants flow, thixotropy and its measurement, negative thixotropy, spur and bulges.

Determination of flow property

Viscometers: capillary, falling sphere, Brookfield Viscometer, cup and bob viscometer and cone and plate viscometer.

Unit-IV

a) Suspensions

Suspension and its classification, advantages and characteristics of an ideal suspension, Interfacial properties of solids, formulation, preparation of suspensions.

b) Emulsions

Classification and advantages of emulsion, appearance and identification test, emulsifying agents, physical instability problem, factors which improve physical stability of emulsion and preparation of emulsion.

Text Books: Recent editions of the following books to be referred

1. Patrick J.Sinko, Martin's Physical Pharmacy. New Delhi:Wolters Kluwer Pvt. Ltd.
2. Subramanyam CVS.Textbook of Physical Pharmacy. New Delhi:Vallabh Prakashan.

Reference Books:

1. BreyWS.Physical Chemistry and Biological Applications. London: Academic Press.
2. Shoemaker DP, Garland CW. Experiments in Physical Chemistry. New York:McGrawHill.
3. Remington, The Science and Practice of Pharmacy, Mack Publishing Co.,U.S.A.

HS-201T ENGLISH/BUSINESS COMMUNICATIONS

UNIT I

Introduction to Business Communication: Importance of communication in business, process and models of communication, Types of information, order, advise, suggestion, motivation, persuation, warning and education.

UNIT II

Business Communication: Written Communication: Letters, Cover Letter, Differences between bio-data, CV and Resume, Letter for Job Application, Thank You Letter, Letter of Complaint, Memos, Memorandum drafting. E. Communication: Email, Social Media, Website Copy and Reports.

Oral Communication: Types of oral communication, Barriers to oral communication, Mass Communication–Nature & Scope of Mass Communication, function of mass communication– Media of mass communication.

UNIT III

Business Report Writing: Report Writing: Types, Structure of a report, Methods and Modelsof Report Writing, Technical Proposal-Concept, Kinds, Layout, and Examples of Technical Proposals.

Types of reports: Progress reports, routine reports–Annual reports–format–Analysis of sample reports from industry– Synopsis and thesis writing.

UNIT IV

Spoken and Presentation Skills: Impromptu speech, tackling hesitation, shyness and nervousness in speaking –Public speaking, academic and professional presentations – Group discussions–facilitate or send impediments Planning, preparing and delivering a presentation, essentials of presentation - etiquette, clarity, lively delivery – speech rhythm, speech initiatorsbody language – voice, posture & gesture, eye contact, dress codes. Speech Drill, Interviewing, Negotiating a job offer.

TextBooks:

1. Essentials of Business Communication by R.Pal and J S Korlahhi, Sultan Chand &Sons, New Delhi.
2. Basic Communication Skills for Technology by Andre J. Rutherford, Pearson EducationAsia, Patparganj, New Delhi.

ReferenceBooks:

1. Business Communication by Meenakshi Raman and Prakash Singh (Oxford)
2. Advanced Communication Skills, V. Prasad, Atma Ram Publications, New Delhi.

BPA-206P PHARMACEUTICAL BIOLOGY

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 8/10 experiments must be performed by a student during the semester.

List of experiments:

1. To study different parts of leaves.
2. To study different parts of flowers.
3. To study different parts of fruits.
4. To study different parts of compound microscope.
5. To study different parts of binocular microscope.
6. To study different root systems
7. To study difference between monocot and dicot plants morphologically.
8. To carry out morphology of leaves, flower and fruit.
9. To study different types of barks.
10. To study different Plant tissues like Parenchyma, collenchyma, sclerenchyma, xylem,phloem etc.

Text Books:

1. Atextbookof 'Pharmacognosy' by R.K.Parmar, Vol.I, Edn.-I, P.Prakashan, India.
2. Kokate CK, Gokhale SB, Purohit AP: Parmacognosy 36thedn. Nirali Prakashan, Pune, India.

Reference Books:

1. Evans WC (2002): Trease and Evan's Pharmacognosy.15thedn., Saunder' Elsevier Pvt Ltd.New Delhi-24, India.
2. Arya V, Kaur R. Kangrian Medicinal Flora. Ist edn. Pranav Prakashan, Kangra, H.P., India.
3. Khandelwal KR (2006): Practical Pharmacognosy Techniques and Experiments 16th Edn. Nirali Prakashan, Pune, India.

BPA-207P: FUNDAMENTALS OF BHAISHAJYA KALPANA-I

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 8/10 experiments must be performed by a student during the semester.

List of experiments:

1. To study the working principle, mechanism and uses of Dolayantra.
2. To study the working principle, mechanism and uses of Patalayantra.
3. To study the working principle, mechanism and uses of Damruyantra.
4. To study the working principle, mechanism and uses of Khalvayantra.
5. To study the working principle, mechanism and uses of Vidyadharayantra.
6. To study the working principle, mechanism and uses of Putayantra.
7. To study the working principle, mechanism and uses of Patanayantra.
8. To study the working principle, mechanism and uses of Disintegrator.
9. To study the working principle, mechanism and uses of Hammermill.
10. To study the working principle, mechanism and uses of Endrunnermill.
11. To study the working principle, mechanism and uses of Rollermill.
12. To study the working principle, mechanism and uses of Capsule filling machine.
13. To study the working principle, mechanism and uses of Grinding machine.
14. To study the working principle, mechanism and uses of Tablet making machine.
15. To study the working principle, mechanism and uses of Tablet hardness anddisintegration test apparatus.

Text Books:

1. Text book of Bhaishajya Kalpana Vigyana by Dr. G. Prabhakar Rao, Chaukhamba Publication, NewDelhi
2. Text Book of Bhaishajya Kalpana Vigyana by Dr. Siddhinandana Mishra, Chaukhamba SanskritBhawan, Varanasi.
3. Textbook of Bhaishajya Kalpana Vigyana by Dr. Santosh Kumar Mishra, ChakhambhaOrientalia, Varanasi.

Reference Books:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I & II Govt. of India Publication.
3. The Ayurvedic Pharmacopoeia of India Part-II, Govt. of India Publication.
4. Ayurved Sara Sangraha.
5. Rasa Tantra Sara avum Siddha Prayog Sangraha, Sri Krishan Gopal Bhawan Kaleda, Rajasthan.

BPA- 208P: PHARMACOGNOSY AND PHYTOCHEMISTRY –I (Practical)

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.Following is suggested a list of exercises out of which a minimum of 8/10 experiments must be performed by a student during the semester.

List of experiments

1) To study the simple and compound microscopes.
2) To study general techniques involved in section cutting, staining, mounting and micro-chemicaltesting.
3) To calibrate eye piece micrometer by stage micrometer.
4) To study the various parameters used in morphological evaluation of crude drugs
5) To study the various parameters used in microscopical evaluation (Qualitative, quantitative andpowder) of crude drugs
6) To determine Palisade ratio of given leaf crude
7) To determine vein-islet number of given leaf crude drug.
8) To determine vein-termination number of given leaf crude drug.
9) To determine stomatal number and stomatal index of given leaf crude drug.
10) To Perform powder microscopic evaluation of given crude drug.
11) To Measure the length and breadth of fibers in the given crude drugs.
12) To measure the size of calcium oxalate crystals of given crude drugs.
13) To determine the preliminary chemical evaluation of crude drugs.
14) To study macroscopic and microscopic features and phytochemical tests for identity of drugs –Glycyrrhiza
15) To study macroscopic and microscopic features and phytochemical tests for identity of drugs –Digitalis
16) To study macroscopic and microscopic features and phytochemical tests for identity of drugs –Aloe
17) To study macroscopic and microscopic features and phytochemical tests for identity of drugs –Senna
18) To study macroscopic and microscopic features and phytochemical tests for identity of drugs –Datura.

Text Books:

1. A text book of *'Pharmacognosy'* by R.K. Parmar, Vol.I, Edn.-I, P.Prakashan, India.
2. Kokate CK, Gokhale SB, Purohit AP: *Parmacognosy* 36th edn. Nirali Prakashan, Pune, India.

Reference Books:

1. Evans WC (2002) : *Trease and Evan's Pharmacognosy*. 15th edn., Saunder' Elsevier Pvt Ltd.New Delhi-24, India.
2. Quality Standards of Indian Medicinal Plants. New Delhi: ICMR.
3. Medicinal Plants of India. New Delhi: ICMR.
4. S.S. Handa Textbook of Pharmacognosy Vallabh Publications, New Delhi.

BPA-209P DRAVYAGUNA VIGYANA II

Note: Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

1. Knowledge of market sample and price of dravya.
2. Drug tour/field visit.
3. Description and identification of drugs mentioned in theory.
4. Prepare any 30 herbarium sheets of drugs mentioned in theory syllabus.

Text Books-

1. Dravyaguna vijana by Dr. Mansi Deshpandey,Chaukhamba Sanskrit Pratisnthana, New Delhi.
2. Dravyaguna vijanaVol 1-5 by Prof. Sharma P.V; published by Chaukhambha BhartiAcademy,Varanasi.

Reference Books:

1. The Wealth of India Publication and Directorate (CSIR, New Delhi)**.**
2. Database on medicinal plants used in Ayurveda by CCRAS, NewDelhi.
3. Indian Medicinal Plants by K.R.Kirtikar and B.D.Basu.
4. The Ayurvedic Pharmacopoeia of India, Govt. of India Publication.
5. Aushadhnaamrupa Vigyanam by Dr. Sanjeev Kumar Lale, published by Hemraj Lale Indore.

BPA-210P PHARMACEUTICS-II (PHYSICAL PHARMACY)

Note:

Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 8/10 experiments must be performed by a student during the semester.

List of experiments:

1. Determination of refractive index of single or compound Ayurvedic drugs by Abbe'srefractometer.
2. Determination of refractive index of single or compound Ayurvedic drugs by Hand'srefractometer
3. Determination of viscosity of single or compound Ayurvedic drugs by OstwaldViscometer.
4. Determination of density, specific gravity of single or compound Ayurvedic drugs.
5. Determination of bulk density and tapped density of single or compound Ayurvedic drugs.
6. Determination of angle of repose of single or compound Ayurvedic drugs.
7. To prepare and dispense of single Ayurvedic drugs.
8. To prepare and dispense of compound Ayurvedic drugs.
9. Determination of thickness and diameter of tablet, Vatti, Guttika by screw gauge, vernircaliper.
10. Determination of Hardness of tablets of single or compound Ayurvedic drugs byMonsanto hardness tester.

Text Books: Recent editions of the following books to be referred

1. PatrickJ.Sinko, Martin's Physical Pharmacy. New Delhi: Wolters Kluwer Pvt. Ltd.
2. Subramanyam CVS, J. Thimma Setty Laboratory manual of Physical pharmaceutics.New Delhi: Vallabh Prakashan.

ReferenceBooks:

1. Brey WS. Physical Chemistry and Biological Applications. London: Academic Press.
2. Shoemaker DP, Garland CW. Experiments in Physical Chemistry. New York: McGrawHill.
3. Remington, The Science and Practice of Pharmacy, Mack Publishing Co.,U.S.A.

SEMESTER-III

BPA-301T DRAVYAGUNA VIGYANA–III

Unit-I

Introduction, Guna, Karma and uses of following jantava dravya (drugs of animal origin).
1. Kasturi 2.Gorochana 3.Gandhamarjaravirya 4.Mrigasringa 5.Bhunaga 6.Mukta 7.Pravala
8. Shankha 9.Shukti 10.Shambuka 11.Varatika 12.Indragopa
Introduction, knowledge of guna-karma and Action of following vargas.
a) Dhanyavarga b) Shakavarga c) Krutannavarga d) Manshavarga e) Phalavarga
f) Jala varga g) Dugdha varga h) Dadhi varga i) Takra varga j) Navneet varga k)Ghruta varga l) Tail varga m)Madhu varga n) Ikshu varga o) Sandhan varga

Unit-II

Ingredients and collective action of following Mishraka varga.
Triphala, Madhuratriphala, Sugandhatriphala, Swalpatriphala, Trikatu, Trimada, Trikantaka , Trikarshika, Trijata, Chaturjata, Chaturbeeja, Chaturbhadra, Chaturushna, Shadushna, Panchakola, Panchavalkala, Panchapallava, Panchakshirivriksha, Panchatikta, Panchamahavisha, Saptaupavisha, Dashamoola, Bruhatpanchamoola, Laghupanchamoola, Trunapanchanmoola, Kantakapanchamoola, Madhyamapanchamoola, Jeevanpanchamoola, Ashtavarga,

Unit-III

Detailed knowledge of following drugs with respect to Basonym of drug, Main Synonyms, Regional Name, Botanical Name, Family, classification of Dravya (Gana) as described in Charak, Sushrut and Bhavaprakasha i.e. Habit and habitat/varieties, External morphology, Useful parts, Important phytoconstituents, Rasapanchaka, Action on Dosha, Dhatu, Mala, Therapeutic indications, Amayikaprayoga and Matra (Therapeutic administration and Dose), Name of important formulations, Adverse effects, remedial measuresand Shodhana (as required)
1. Hingu 2.Jambu 3 Jatamamsi 4. Jatiphala 5.Jeerakadvaya 6. Jyotishmati 7.Kalamegha 8.Kampillaka 9.Kanchanara 10.Kantakari 11.Kapikacchu 12.Karkatakshringi 13.Karpura 14.Katuki 15. Khadira 16. Kiratatikta 17.Kumari 18. Kupilu 19. Kumkumkesara 20.Kushmanda 21. Lavanga 22. Kutaja 23.Lodhra 24.Madanaphala 25.Manjishtha 26.Maricha 27.Markandika 28.Musali 29.Musta 30.Nagakeshara

Unit-IV

Detailed knowledge of following drugs with respect to Basonym of drug, Main Synonyms, Regional Name, Botanical Name, Family, classification of Dravya (Gana) as described in Charak, Sushrut and Bhavaprakasha i.e Habit and habitat/varieties, External morphology, Useful parts, Important phytoconstituents, Rasapanchaka, Action on Dosha, Dhatu, Mala, The rapeutic indications, Amayikapra yoga and Matra (Therapeutic administration and Dose), Name of important formulations, Adverse effects, remedial measures and Shodhana (as required)
1.Nimba 2.Nirgundi 3.Palasha 4.Palandu 5.Pashanabheda 6.Patala 7.Patola 8.Pippali- pippalimula 9.Punarnava 10.Rasna 11.Chakramarda 12.Champaka 13.Chirbilva 14.Chopachini 15.Dattura 16. Darbha 17.Dhanvayasa 18.Dronapushpi 19.Gandhaprasarini 20.Garjara 21.Gojihva, 22.Gorakshaganja 23.Gunja 24.Hinstra 25.Hrutpatri 26.Indravaruni 27.Ingudi 28.Irimeda 29.Isvari 30.Japa

Textbooks

1. Dravyaguna vijana by Dr. Mansi Deshpandey, Chaukhamba Sanskrit Pratisnthana, New Delhi.
2. Dravyaguna vijanaVol 1-5 by Prof. Sharma P.V; published by Chaukhambha BhartiAcademy,Varanasi.
3. Aushadhnaamrupa Vigyanam by Dr. Sanjeev Kumar Lale, published by Hemraj Lale Indore.

Reference Books

1. The Wealth of India Publication and Directorate (CSIR, New Delhi)
2. Database on medicinal plants used in Ayurveda by CCRAS, New Delhi.
3. Indian Medicinal Plants by K.R.Kirtikar and B.D.Basu.

BPA-302T PHARMACOGNOSY & PHYTOCHEMISTRY-II

Unit-I

Systematic study of crude drugs (Synonym, Biological source, Chemical constituents, uses, substitutes, pharmacology etc.) and factor affecting cultivation (altitude, temperature, humidity, rainfall, soil, fertilizers, pest and pest control), Collection, harvesting (drying) and Storage ofcrude drugs with examples. River system, mineral wealth and medicinal plants of Himachal Pradesh.

Unit-II

Theory of extraction, properties of solvent, extraction techniques including Maceration, Percolation, Soxhlation, Hydro-distillation, Digestion, Decoction, Infusion and a brief introduction to isolation techniques of plant secondary metabolites.

Unit-III

A) Drugs containing Plant metabolites

Study of Biological source, Chemical constituents and uses ofCarbohydrates-Starch–Maize, Amrita Satwa, Honey.

Gums–Babulniryas, Shalmaliniryas.

Mucliages–Isabgola, Brihatgokshura, Bilvaphal, Svetamusli.

B) Study of Biological source, Chemical constituents and uses of Volatile Oils

Dhanyaka, Misreya, Krishnajeerka, Svetajiraka, Ajamoda, Yavani, Lavanga, Jaiphal, Talisapatra, Tamalpatra, Vastuka, Svetachandana, Vacha, Devadaru, Jatamansi, Nilgiri.

C) Study of Biological source, Chemical constituents uses and organoleptic characters ofTannis: Ashoka, Arjuna, Khadir, Karkatasringi, Mayaphal, Haritaki, Bhaibhitak and Amalaki.

Unit-IV

Study of Biological source, Chemical constituents and uses of Glycosides

a) Anthraquinone glycosides-Svarnapatri, Kumari, Manjishta, Aragvadha, Chakramarda.
b) Cardiac -Karavira, Arka, Vanapalandu, Digitalis.
c) Saponins -Brahmi, Mandukparni, Laghugokshura, Arishtaka, Kantakari, Shatavari.
d) Flavonoids -Yashtimadhu, Bhallataka, Karanja, Kalmegh, Palash.
e) Coumarians -Bakuchi, Ajamoda.
f) Bitters -Kiratikta, Katuki, Guduchi.

Unit V

Concept of adulteration including its types and detection methods and study of adulterants in the following drugs-Orange peel, cinnamon, nutmeg, eucalyptus, cardamom, fennel, Kuth and clove. A brief introduction to basic food laws in India and FSSAI.

TextBooks:

1. A textbook of *'Pharmacognosy'* by R.K. Parmar, Vol.I, Edn.-I, P.Prakashan, India.

2. Kokate CK, Gokhale SB, Purohit AP: *Parmacognosy* 36th edn. Nirali Prakashan, Pune, India.

Reference Books:

1. Evans WC (2002): *Trease and Evan's Pharmacognosy*, 15thedn., Saunder' Elsevier Pvt Ltd.New Delhi-24, India.

2. Quality Standards of Indian Medicinal Plants. New Delhi: ICMR.

3.Medicinal Plants of India. New Delhi: ICMR.

BPA-303T PHARMACEUTICAL CHEMISTRY-ORGANIC AND INORGANIC CHEMISTRY

ORGANIC CHEMISTRY

Unit-I

a) **Structure and Properties**
Basic atomic and molecular structure with their properties-hybridization, valance bond theory, dipole moment, empirical formula, inter and intramoleculer hydrogen bonding, ionic and covalent bonding in chemical compounds.

b) **Aliphatic Compounds**
Structure, nomenclature, preparation and reactions of alkanes and structure, nomenclature, preparation and reactions of alkenes. Inductive and electromeric effects.

Unit-II

a) **Isomerisim**
Isomerism and nomenclature and associated physicochemical properties, optical activity.

b) **Reaction Mechanisms**
Addition reactions, Elimination reactions, Substitution reactions (nucleophilic and electrophilic substitutions).

INORGANIC CHEMISTRY

Unit-III

a) **Introduction of PeriodicTable**
Introduction of periodic table, electronic configuration. Properties and important compounds ofiron, gold and potassium.

b) **Pharmaceutical Agents**
Preparation and uses of Ammonium chloride and physical and chemical properties of Borax withtheir uses.

Unit-IV

a) **Quantitative and Qualitative study**
General introduction of Quantitative and Qualitative study of heavy metals (Lead, arsenic, mercury)in Ayurvedic preparation.

b) **Titrametric analysis**
General introduction of Titrametric analysis and General introduction of Gravimetric methods ofanalysis.

Text Books:

1) Sykes PA. A Guidebook to Mechanisms in Organic Chemistry. Hyderabad: Orient Longman.
2) Vogel.Vogel's Textbook of Micro and Semimicro Qualitative Inorganic Analysis. Hyderabad.

Reference Books:

1) Block JH, Roche E, Soine TO, Wilson CO. Inorganic Medicinal and PharmaceuticalChemistry. Philadelphia: Lea and Febiger.
2) Jeffery GH, Bessett J, Mendham J, Denney RC. Vogel's Textbook of Quantitative InorganicAnalysis including Elementary Instrumental Analysis. London: ELBS and Longman
3) Roberts JD, Caserio MC. Basic Principles of Organic Chemistry. New York: WA. BenjaminInc.

BPA-304T PHARMACOLOGY-I

Unit-I

Introduction: Definition, scope and development of pharmacological thought (historical development). ADME: Drug absorption, bioavailability, bioequivalence, route of drug administration, Plasma protein binding, half life of drug, biotransformation and cytochrome P450 monooxygenase system and excretion of drug. Molecular Pharmacology: Molecular mechanisms of drug action, receptors, theory of receptors, dose response relationship. Affinity constants, potentiation, antagonism phenomenon.

Unit-II

Pharmacology of Autonomic Nervous System: Autonomic neurotransmission, parasympathomimetics, parasympatholytics, sympathomimetics, sympatholytics ganglion transmission and blocker, neuromuscular blocking agents and antispasticity drugs.

Unit-III

Pharmacology of Central Nervous System: Synaptic transmission in the CNS, general anaesthetics, hypnosedatives, analgesics, antipyretics, anti-inflammatory agents and drugs used in gout, antiepileptics, anti-parkinsonian drugs, psychopharmacological agents (antipsychotics, antianxiety and antidepressant agents), CNS stimulants and hallucinogens.

Unit-IV

Local anaesthetics- Classification, mechanism of action, adverse effects, contraindications.

In-vivo Synthesis of Histamine and antihistamine- Classification, mechanism of action, adverseeffects, contraindications.

TextBooks:

1. Tripathi KD. Essential of medical Pharmacology, New Delhi: Jaypee BrothersMedical Publishers,
2. Ghosh MN. Fundamentals of Experimental Pharmacology. Kolkata: Scientific Book Agency.
3. Kulkarni SK. Handbook of Experimental Pharmacology. New Delhi:Vallabh Prakashan.

Reference Books:

1. Rang MP, Dale MM, Riter JM. Pharmacology. New York: Churchill Livingstone.
2. Brunton LL, Lazo JS, Parker KL. Goodman and Gilman's The PharmacologicalBasis of Therapeutics. New York: McGrawHill.
3. Mycek MJ, Harvey RA, Champe PC. Lipponcott's Illustrated Reviews-Pharmacology. Philadelphia: Lippincott Williams &Wilkins.

BPA-305T BHAISHAJYA KALPNA-II

Unit-I Mana paribhasa

Classification of mana, payyamana, druvayamana, putavamana, kalamana, Magadhamana,kudavapatra, kalingamana, paschatyamanaparibhasa, metric system, imperial system.

Unit-II Dravyasangrahana

Collection of drugs, jangama dravya sangrahana, prayojyangas, agrahya dravyas, methods of adulteration, aushdha kalpana pariksanavidhi.

Unit-III Ausadhakalpana

Kalpana classification, pancavidhakashaya kalpana, pancakasayayoni, swarasakalpana, putapaka swarasa, kalka kalpana, kwatha kalpana, saptavidha kasaya, kwatha churna, paniyakalpana, sadanga paniya, phanta kalpana, hima kalpana, usnodaka, tandulodaka, laksa rasakalpana, mamsarasa, vesavara, mantha kalpana, ausadha siddha paniya, yusa kalpana, arkakalpana, panaka kalpana, arka kalpana, syrups, elixirs, linctuses, pramathya, phanita, rasakriya, rasanjana, mosabbar, gudapaka, Avalehakalpana, Ghanasattva, churnakalpana, modern aspect of churna (powders).

Unit-IV

a) Definitions of Ayurvedic, Siddha and Unani drugs, drug, patent or proprietary medicine, standard quality, misbranded drugs, adulterated drugs, spurious drugs, misbranded cosmetics, spurious cosmetics, adulterated cosmetics as mentioned in the Drugs and Cosmetics Act and Rules.

b) Provisions applicable to manufacture of Ayurvedic, Siddha and Unani Drugs, technical staff, Drugs Technical Advisory Board, Ayurvedic, Siddha and Unani Drugs Consultative Committee, Labelling, packing and limit of alcohol in Ayurvedic and Unani Drugs.

Text Books:

1. Text book of Bhaishajya Kalpana Vigyana (A Science of Indian Pharmacy) by Dr. K.Ramachand Reddy,Chaukhamba.
2. Textbook of Bhaishajya Kalpana Vigyana by Dr.Siddhinandana Mishra, ChaukhambaSanskrit Bhawan,Varanasi.
3. Textbook of Bhaishajya Kalpana Vigyana by Dr.Santosh Kumar Mishra, ChakhambhaOrientalia, Varanasi.

Reference Books:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I & II, Govt. of India Publication.
3. The Ayurvedic Pharmacopoeia of India Part-II, Govt. of India Publication.
4. Ayurved Sara Sangraha.
5. Rasa Tantra Saraavum Siddha Prayog Sangraha, SriKrishan Gopal Bhawan Kaleda,Rajasthan.

BPA-306T PATHOPHYSIOLOGY

Unit-I

a) Basic principles of Cell injury and Adaptation:
Introduction, definitions, Homeostasis, Components and Types of Feedback systems, Causes of cellular injury**,** Pathogenesis (Cell membrane damage, Mitochondrial damage, Ribosome damage, Nuclear damage)**,** Morphology of cell injury – Adaptive changes (Atrophy, Hypertrophy, hyperplasia, Metaplasia, Dysplasia)**,** Cell swelling, Intra cellular accumulation, Calcification, Enzyme leakage and Cell Death Acidosis &Alkalosis, Electrolyte imbalance.

b) Basic mechanism involved in the process of inflammation and repair:
Introduction, Clinical signs of inflammation, Different types of Inflammation, Mechanism of Inflammation – Alteration in vascular permeability and blood flow, migration of WBC's, Mediators of inflammation, Basic principles of wound healing in the skin, Pathophysiology of Atherosclerosis

Unit-II

a) Cardiovascular System:
Hypertension, congestive heart failure, ischemic heart disease (angina, myocardial infarction, atherosclerosis and arteriosclerosis)
b) Respiratory system: Asthma, Chronic obstructive airways diseases.
c) Renal system: Acute and chronic renal failure

Unit-III

a) Haematological Diseases:
Iron deficiency, megaloblastic anemia (Vit B12 and folic acid), sickle cell anemia, thalasemia,hereditary acquired anemia, hemophilia
b) Endocrine system: Diabetes, thyroid diseases, disorders of sex hormones
c) Nervous system: Epilepsy, Parkinson's disease, stroke, psychiatric disorders: depression,schizophrenia and Alzheimer's disease.
d) Gastrointestinal system: Peptic Ulcer

Unit-IV

Inflammatory bowel diseases, jaundice, hepatitis (A,B,C,D,E,F) alcoholic liver disease.
Disease of bones and joints: Rheumatoid arthritis, osteoporosis and gout
Principles of cancer: classification, etiology and pathogenesis of cancer

Unit-V

a) Infectious diseases: Meningitis, Typhoid, Leprosy, Tuberculosis Urinary tract infections
b) Sexually transmitted diseases: AIDS, Syphilis, Gonorrhea

TextBooks:

1. Vinay Kumar, Abul K. Abas, Jon C. Aster; Robbins & Cotran Pathologic Basis of Disease; SouthAsia edition; India; Elsevier; 2014.
2. HarshMohan; Text book of Pathology; 6th edition; India; Jaypee Publications; 2010.
3. Laurence B, Bruce C, Bjorn K. ; Goodman Gilman's The Pharmacological Basis of Therapeutics;12th edition; New York; McGraw-Hill; 2011.
4. Best, Charles Herbert 1899-1978; Taylor, Norman Burke 1885-1972; West, John B (John Burnard);Best and Taylor's Physiological basis of medical practice; 12th ed; united states;
5. William and Wilkins, Baltimore;1991 [1990 printing].

6. Nicki R. Colledge, Brian R. Walker, Stuart H. Ralston; Davidson's Principles and Practice ofMedicine; 21st edition; London; ELBS/Churchill Livingstone; 2010.
7. Guyton A, John .E Hall; Textbook of Medical Physiology; 12th edition; WB Saunders Company;2010.
8. Joseph DiPiro, Robert L. Talbert, Gary Yee, Barbara Wells, L. Michael Posey; Pharmacotherapy:A Pathophysiological Approach; 9th edition; London; McGraw-Hill Medical; 2014.
9. V. Kumar, R. S. Cotran and S. L. Robbins; Basic Pathology; 6th edition; Philadelphia; WBSaunders Company; 1997.
10. Roger Walker, Clive Edwards; Clinical Pharmacy and Therapeutics; 3rd edition; London; Churchill Livingstone publication; 2003.

BPA-307P DRAVYAGUNA VIGYANA–III

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

1. Knowledge of market sample and price of dravya.
2. Drug tour/field visit.
3. Description and identification of drugs mentioned in theory.
4. Prepare any 30 herbarium sheets of drugs mentioned in theory syllabus.

Text Books-

1. Dravyaguna vijana by Dr. Mansi Deshpandey, Chaukhamba Sanskrit Pratisnthana, New Delhi.
2. Dravyaguna vijana Vol 1-5 by Prof. Sharma P.V; published by Chaukhambha BhartiAcademy,Varanasi.

Reference Books:

1. The Wealth of India Publication and Directorate (CSIR, New Delhi) 2.Database on medicinal plants used in Ayurveda by CCRAS, New Delhi.
3. Medicinal Plants of Himachal Pradesh by Dr.N.S.Chauhan Minerva Publications.
4. Aushadhnaamrupa Vigyanam by Dr. Sanjeev Kumar Lale, published by Hemraj Lale Indore

BPA-308P PHARMACOGNOSY& PHYTOCHEMISTRY-II

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.Following is suggested a list of exercises out of which a minimum of 8/10 experimentsmust be performed by a student during the semester.

List of experiments

a) To prepare chemomicroscopic reagents like Glycerine–water, safranin, sudan–iii,phloroglucinol, iodine water, chloral hydrate solution, picric acid solution etc.
b) To carry out Morphology of leaves including leaf margins, venations, types.
c) To carry out Morphology study of Dhanyaka.
d) To carry out Morphology study of Khadir.
e) To carry out Morphology study of Amalaki.
f) To carry out Morphology study of Ashoka Twak, Haritki.
g) To carry out T.S. Microscopy of Guduchi.
h) To carryout T.S. Microscopy of Lavang.
i) To carry out T.S. Microscopy of Misreya.
j) To carry out extraction of some drugs by various methods studied in theory.
k) Study of Leaf characters like trichomes and stomata few drugs listed in the theory.
l) To carry out extraction of volatile oils containing drugs listed in the theory.

Text Books:

1. A text book of *'Pharmacognosy'* by R.K. Parmar, Vol.I, Edn.-I, P. Prakashan, India.
2. Kokate CK, Gokhale SB, Purohit AP: *Parmacognosy* 36thedn. Nirali Prakashan, Pune, India.

Reference Books:

1. Evans WC (2002): *Trease and Evan's Pharmacognosy*. 15th edn., Saunder' Elsevier Pvt Ltd.New Delhi-24, India.
2. Quality Standards of Indian Medicinal Plants. New Delhi: ICMR.
3. Medicinal Plants of India. New Delhi:ICMR.
4. S.S. Handa Textbook of PharmacognosyVallabh Publications, New Delhi.

BPA-309P PHARMACEUTICAL CHEMISTRY-ORGANIC AND INORGANIC CHEMISTRY

Note: Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Followingis suggested a list of exercises out of which a minimum of 8/10 experiments must be performed by a student during the semester.

List of experiments:

1. To study instrumentation and working of pH meter.
2. To study instrumentation and working of distillation.
3. Determination of boiling point.
4. To prepare nitrobenzene.
5. To prepare m-dinitrobenzene.
6. Limit test for chlorides, sulfates
7. Determination of meltingpoint.
8. Identification of Nitrogen in compounds.
9. Identification of Halogen in compounds.
10. Estimation of NaOH by Titration.

Text Books:

1. Orient Longman. Atherden LM. Bentley and Driver's Textbook ofPharmaceutical Chemistry. New Delhi: Oxford University Press.
2. Vogel.Vogel's Textbook of Micro and Semimicro Qualitative InorganicAnalysis. Hyderabad.

Reference Books:

1. Block JH, Roche E, Soine TO, Wilson CO. Inorganic Medicinal and Pharmaceutical Chemistry.Philadelphia: Lea and Febiger.
2. Jeffery GH, Bessett J, Mendham J, Denney RC. Vogel's Textbook of Quantitative Inorganic Analysis including Elementary Instrumental Analysis. London: ELBS and Longman
3. Mann FC, Saunders BC. Practical Organic Chemistry. London: ELBS/Longman.
4. Morrison TR, Boyd RN. Organic Chemistry. New Delhi: Prentice Hall India.
5. Roberts JD, Caserio MC. Basic Principles of Organic Chemistry. New York: WA. Benjamin Inc.

BPA 310P PHARMACOLOGY-I

Note: Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Followingis suggested a list of exercises out of which a minimum of 8/10 experiments must be performed by a student during the semester.

List of Experiments

1. Introduction to experimental pharmacology and commonly used instruments in experimental pharmacology.
2. Study of common laboratory animals and common laboratory technique : Blood withdrawal, serum andplasma separation.
3. Maintenance of laboratory animals as per CPCSEA guidelines.
4. Study of different routes of drugs administration in mice/rats.
5. Study of effect of hepatic microsomal enzyme inducers on the phenobarbitone sleeping time in mice.
6. Effect of drugs on ciliary motility of frog oesophagus
7. Effect of drugs on rabbit eye.
8. Effects of skeletal muscle relaxants using rota-rod apparatus.
9. Effect of drugs on locomotor activity using actophotometer.
10. Anticonvulsant effect of drugs by MES and PTZ method.
11. Study of stereotype and anti-catatonic activity of drugs on rats/mice.
12. Study of anxiolytic activity of drugs using rats/mice.
13. Study of local anesthetics by different methods

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology. Churchil LivingstoneElsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins 5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology

BPA-311P BHAISHAJYA KALPNA-II

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested list of exercises out of which a minimum of 12/15 experiments must be performed by a student during the semester.

List of experiments:

1. To prepare *Ardraka Swarasa*.
2. To prepare *TulsiSswarasa*.
3. To prepare *Vasa putpaka swarasa.*
4. Preparation of *Kalka*.
5. Preparation of *Kwatha*.
6. Preparation of *Hima*.
7. Preparation of *Phanta*.
8. Preparation of *Shadangapaniya*.
9. To prepare *Sitopaladi churna*.
10. To prepare *Talisadi churna*.
11. To prepare *Hingvshtaka churna*.
12. To prepare *Chyawanprasha Avaleha*.
13. To prepare *Vasa Avaleha.*
14. To prepare *Arka.*
15. To prepare *Panaka Kalpana.*

Text Books:

1. Textbook of Bhaishajya Kalpana Vigyana (A Science of Indian Pharmacy) by Dr. K.Ramachandra Reddy, Chaukhamba.
2. Text book of Bhaishajya Kalpana Vigyana by Dr. Siddhinandana Mishra, ChaukhambaSanskrit Bhawan,Varanasi.
3. Text book of Bhaishajya Kalpana Vigyana by Dr. Santosh Kumar Mishra, Chakhambha Orientalia,Varanasi.

Reference Books:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I &II, Govt. of India Publication.
3. The Ayurvedic Pharmacopoeia of India, Part-II, Govt. of India Publication.
4. Ayurved Sara Sangraha.
5. Rasa Tantra Saraavum Siddha Prayog Sangraha, Sri Krishan Gopal Bhawan Kaleda,Rajasthan.

SEMESTER-IV

BPA-401T PHARMACEUTICAL ANALYSIS OF AYURVEDIC DRUGS-I

Unit-I

Analytical parameters of Ayurvedic dosage formulations viz. solid, liquid and gaseous formulations. Determination of different physico-chemical parameters of solid dosage formulations like foreign matter, loss on drying, total ash content, acid insoluble ash, extractive values etc.

Unit-II

Determination of different physico-chemical parameters of liquid dosage formulations like boiling point etc. Determination of alcohol content, volatile oil content, optical activity and its determination.

Unit-III

Determination of different physico-chemical parameters of gaseous dosage formulations. Methods for analysis of raw materials and single Ayurvedic drugs.

Unit-IV

Methodology to study toxicity of different Ayurvedic drug, metallic and herbal formulations. Limits for toxicity studies as per WHO guidelines for example- Mercury, lead, arsenic. In–vivo methods for evaluation of toxicity.

Text Books:

1. A textbook of *'Pharmacognosy'* by R.K.Parmar, Vol.I, Edn.-I, P.Prakashan, India.
2. Munson JW. Pharmaceutical Analysis: Modern Methods. Part A & B. New York:Marcel Dekker.

Reference Books:

1. Willard HH, Merritt LL, Dean JA. Instrumental Methods of Analysis. New Delhi: CBS Publishers.
2. Ewing GW. Instrumental Methods of Chemical Analysis.Singapore:Mc Graw Hill.
3. Schirmer RE. Modern Methods of Pharmaceutical Analysis. Vol 1 & 2. Pennsylvania:Franklin Book Co.
4. Kemp W.Organic Sepctroscopy: London: ELBS/WH Freeman & Co.

BPA-402T PHARMACOGNOSY & PHYTOCHEMISTRY-III

Unit-I

Study of biological source, chemical constituents and uses of secondary metabolites

a) Alkaoids present in:-

Vasaka, Datura, Indrayava, Arkapatri, Kutaja, Soma (Ephedra), Patha, Puga, Maricha,Vatsanabha, Ativisha, Ahiphena, Punarnava, Shankhapuspi, Sarpagandha and Daruharidra.

b) Volatile oils aromatic oils / Resin / Resin Combinations Present in–

Musta, Kulanjana, Kushtha, Ardraka, Haridra, Trivrit, Vijaya, Indravaruni, Vidanga, Kampillaka, Nagakesara, Guggulu,Shallaki, Sarala, Sarjarasa and Hingu.

c) Fixed oils and Waxes Present in–

Eranda, Tila, Karanja, Jyotishmati, Madhucchishta (beeswax).

Unit-II

Evaluation of the crude drugs including Physical, Chemical, Biological evaluation and Factors affecting herbal drug Constituents including authentication, environment, time of harvesting, pesticides etc.

Unit-III

Brief introduction to Rasayana including its classification and important examples, Natural Pesticides and Allergens (inhalants, infectants, ingestants, injectants etc.). Brief concept of Aromatherapy.

Unit-IV

Quantitative microscopy

Camera lucida drawings- Concept of Vein-islet number, Vein termination number, Palisade ratio, Stomatal Number, Stomatal index, Measurement (Micrometery) of elements like Trichomes, Crystals, Xylem vessel, Fiber etc.

Unit V

Study of the biological sources, chemical constituents and uses of drugs –

Alkaloid containing drugs:

a.*Pyridine- piperidine group*: Tabacco, Areca and Lobelia

b. *Tropane group*: Belladonna, Hyoscyamus, Coca.

c. *Quinoline, isoquinoline group*: Ipecac, Cinchona and Opium.

d. *Imidazolegroup*: Pilocarpus.

e. *Steroidal group*: Veratrum, Kurchi Bark and Guggulu.

f. *Alkaloidal amine group: Ephedra* and Colchicum

g. **Saponin containing drugs**: Senega, Dioscorea

h. **Cardioactive drugs**: Squill, Strophanthus, Thevetia.

i. Anthraquinone cathartics: Rhubarb and Cascara

j. **Volatile Oils**: Roseoil, lavender oil, patchouli oil, sandal wood oil, lemongrass oil, orange oil, jasmine oil, geranium oil.

Text Books:

1. A textbook of*'Pharmacognosy'* by R.K. Parmar, Vol.I, Edn.-I, P.Prakashan, India.
2. Kokate CK, Gokhale SB, Purohit AP: *Parmacognosy* 36th edn. Nirali Prakashan,Pune,India.

ReferenceBooks:

1. Evans WC(2002) : *Trease and Evan's Pharmacognosy*. 15thedn., Saunder' Elsevier PvtLtd. New Delhi-24, India.
2. Quality Standards of Indian Medicinal Plants. New Delhi: ICMR.

3. Medicinal Plants of India. New Delhi: ICMR.
4. S.S.HandaTextbookof PharmacognosyVallabh Publications, New Delhi

BPA-403T PHARMACEUTICAL ENGINEERING

Unit-I

Introduction

Fundamental principles / laws, simple cases of material and energy balances applied on single units,unit conversions.

a) Mixing of Solids:

Mechanism of mixing in solids, factors influencing mixing, classification of solid mixingequipments-Double cone blender, Ribbon blender,Sigma blade mixer, Planetary mixer.

Unit-II

a) Filtration

Process and application of filtration, Mechanism, Theory of filtration, classification of filtration equipments, principle, construction, working, use of Plate and frame filterpress, Rotary drum filters, Metafilters.

b) Centrifugation

Application, theory of centrifugation, classification of centrifuges, principle, construction, working, use of Perforated and nonperforated basket centrifuge, Semicontinuous centrifuge, supercentrifuge.

Unit-III

a) Evaporation

Application, evaporation process, factors affecting evaporation, classification of evaporators. Theory of evaporation, heat transfer coefficient, material and energy balance.

Equipments:-Principle, construction, working and use of evaporating pan, Horizontal, vertical tube evaporator, rising film, falling film, forced circulation evaporators, multiple effect evaporators.

Unit-IV

a) Basic laws of heat transfer

Application, mechanism of heat flow (Conduction, convection and radiation), principle, construction, working, use of shell tube heat exchanger, double pipe heat exchanger, liquid to liquid interchanger.

b) Materials for pharmaceutical plant construction: Factors affecting the choice for selection of material, classification of material for plant construction.

TextBooks: Recent editions of the following books to be referred

1. Lachman L, Lieberman HA, Kanig JL. The Theory and Practice of IndustrialPharmacy. Philadelphia: Lea & Febiger.

2. Subrahmanyam CVS. Pharmaceutical Engineering. New Delhi: Vallabh Prakashan.

Reference Books:

1. McCabe WL, Smith JC, Harriolt P. Unit Operations of Chemical Engineering.London: McGrawHill.

2. Badger WL, Banchero JT. Introduction to Chemical Engineering. London: McGrawHill.

3. Brown CG. Unit Operations. New Delhi: CBS Publishers.

BPA-404T BHAISHAJYA KALPNA–III

Unit-I *Ausadha kalpana*

Vati kalpana, synonyms of *Vati* e.g. *Gutika, Varti, Vataka, Pinda, Pindi, Modaka.* Modern aspect of vati (tablet), coating of tablets, polishing. *Varti kalpana* (Suppositories)*; Guggulu Kalpana; Lavana Kalpana, Arkalavana, Narikelalavana; Masi kalpana, Hastidant masi, Triphala masi; Ayaskrti kalpana, Kshira paka, Kshara Kalpana, Kshara sutra, Apamarga ksara, Snuhi ksara.*

Unit-II

Sneha kalpana

Ghrita, taila, sneha murcchana, ghrta murcchana, taila murcchana, sarsapa taila murcchana.

General method of *sneha paka, mrdu paka, madhyam paka, khara paka, ama paka, dagdhapaka, patrapaka organdhapaka, suryapaka (adityapaka).*

Unit-III *Sandhana kalpana*

Classification of *Sandhana kalpana*, *Asava* and *Arista kalpana*, preparation of *asava* and *arista*, other types of *sandhana kalpana, sidhu, sura, prasanna, kadambari, jagala, medaka, bakkasa, varuni, sukta, chukra, kanjika, sandaki,* modern aspect of alcoholic formulations.

Unit-IV

Standardization protocols

Protocols for standardization for each step of drug production i.e. from the raw drug standardization to the standardization of finished product. Protocol-I, standardization of raw drug, Protocol-II, SOP's for preparation of extracts, Protocol-III, standardization of plant extract (partused), Protocol-IV, SOP's of finished products, Protocol-V, standardization of formulations. In-process standardization: SOP's for preparation of *Asava-Arista, Churna, Avaleha, Ghrita/Taila, Guggulukalpa, Vati*. Final product standardization: Analytical specifications of *Asava-Arista, Churna, Avaleha, Ghrita/Taila, Guggulukalpa, Vati, Lepa, Kshara & Lavana.*

Text Books:

1. Text book of Bhaishajya Kalpana Vigyana (A Science of Indian Pharmacy) by Dr. K.Ramachandra Reddy, Chaukhamba.
2. Textbook of Bhaishajya Kalpana Vigyana by Dr. Siddhinandana Mishra, ChaukhambaSanskrit Bhawan, Varanasi.
3. Textbook of Bhaishajya Kalpana Vigyana by Dr. Santosh Kumar Mishra, Chakhambha Orientalia, Varanasi.

Reference Books:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I & II, Govt. of India Publication.
3. The Ayurvedic Pharmacopoeia of India, Part-II, Govt. of India Publication.
4. Rasa Tantra Saraavum Siddha Prayog Sangraha, Sri Krishan Gopal Bhawan Kaleda,Rajasthan.

BPA-405T DRAVYAGUNAVIGYANA–IV

Unit-I

Concept of Abhav pratinidhi dravya (drug substitution):

Detail study by comparing Dravyaguna Vigyana, morphology and phytochemistry of original and substitute drug 1) Pushkarmool- Kushtha 2) Murva- Manjistha Tvak 3) Daruharidra- Haridra 4) Bakuchi-Chakramarda 5) Bharangi-Talispatra/Kantkarimool 6) Madhuyashti- Dhataki 7) Amlavetas-Chukra 8) Kunkum- Kusumbhkusum 9) Shweta Chandan- Karpur 10) Shweta Chandan and Karpur-Raktachandana 11) Raktachandan- Ushir 12) Ativisha- Musta 13) Bhallatak- Chitrak

Adulteration of drugs and methods of identification:

1) Guggulu 2) Hingu 3) Lavang 4) Tvak 5) Kampillakchurna 6) Keshar 7) Madhu 8) Daruharidra

Unit-II

Controversial aspects of Ayurvedic Drugs:

Study of Controversial drugs. Genesis, factors responsible for controversy, steps to resolve controversy.

Study of following drugs including classical references, base of controversy, review of probable available candidates, resolution and conclusion.

(1) Rasna (2) Pashanbheda (3) Amalavetas (4) Brahmi (5) Murva (6) Sankhpushpi (7) Parpat (8) Priyangu (10) Kaknasa (11) Jivanti (12) Daruharidra

Knowledge of TKDL, IPR, Publications and related issues. Brief knowledge about WHOs “Essential Drug List”. Knowledge about Pharmacovigilance (ADR) in Ayurveda and conventional system of medicine

Unit-III

Detailed knowledge of following drugs with respect to Basonym of drug, Main Synonyms, Regional Name, Botanical Name, Family, classification of Dravya (Gana) as described in Charak, Sushrut and Bhavaprakasha i.e. Habit and habitat/varieties, External morphology, Useful parts, Important phytoconstituents, Rasapanchaka, Action on Dosha, Dhatu, Mala, Therapeutic indications, Amayikapra yoga and Matra (Therapeutic administration and Dose), Name of important formulations, Adverse effects, remedial measures and Shodhana (as required)

1.Vidari 2.Vidanga 3.Yastimadhu 4.Yavani 5.Devadaru 6.Jati 7.Jayapala 8.Jeevanti, 9.Kadali, 10.Kadamba 11.Kaidarya 12.Kamala 13.Kankola 14.Kakamachi 15.Karanja 16.Karira 17.Karpasa 18. Karavira 19.Karavellaka 20. Kasha 21.Kasni 22.Kataka 23.Katphala 24.Kharjura 25.Kitmari

Unit-IV

Detailed knowledge of following drugs with respect to Basonym of drug, Main Synonyms, Regional Name, Botanical Name, Family, classification of Dravya (Gana) as described in Charak, Sushrut and Bhavaprakasha i.e. Habit and habitat/varieties, External morphology, Useful parts, Important phytoconstituents, Rasapanchaka, Action on Dosha, Dhatu, Mala, Therapeutic indications, Amayikapra yoga and Matra (Therapeutic administration and Dose), Name of important formulations, Adverse effects, remedial measures and Shodhana (as required)

1. Rasona 2.Saireyaka 3.Shallaki 4.Saptaparna 5.Sarpagandha 6.Sariva 7.Shalaparni 8.Shalmali 9.Shankhapushpi 10.Shatavari 11.Shathapushpa 12.Shigru 13.Shirisha 14.Shyonaka 15.Thalisapatra 16.Tila 17.Trivrut 18.Tulasi 19.Tvak 20.Ushira 21.Vacha 22.Varuna 23.Vasa 24.Vata 25.Vatsanabha.

Text Books:

1. Dravyaguna vijana by Dr. Mansi Deshpandey, Chaukhamba Sanskrit Pratisnthana, New Delhi.
2. Dravyaguna vijana Vol 1-5 by Prof. Sharma P.V; published by Chaukhambha Bharti Academy,Varanasi.

Reference Books:

1. The Wealth of India Publication and Directorate (CSIR,New Delhi)
2. Database on medicinal plants used in Ayurveda by CCRAS, NewDelhi.
3. Medicinal Plants of Himachal Pradesh by Dr.N.S.Chauhan Minerva Publications.
4. Aushadhnaamrupa Vigyanam by Dr. Sanjeev Kumar Lale, published by Hemraj Lale Indore

BPA-406T PHARMACOLOGY–II

Unit-I

Coagulants (Alum, Chitosan) and anticoagulants (heparin, warfarin, aspirin), Antiplatelet (clopidogrel, dipyridamole, aspirin) and fibrinolytic drugs (streptokinase and urokinase), haematinics (iron, Vit.$B_{12,}$ folic acid, Vit.C)

Unit-II

Pharmacology of Endocrine System:

Introduction to endocrine Pharmacology, thyroid and antithyroid agents, hormones of pancreas and oral hypoglycemics, adrenocorticosteroids and adrenocortical antagonist, pituitary hormones, gonadal hormones and their inhibitors.

Unit-III

Oral contraceptives uses, side effects and mechanism of action- Levonorgestrel, Estrogen, Progestin and hormones regulating calcium homeostasis. Parathyroid hormone (PTH), 1,25- dihydroxy Vitamin D3 (VitaminD3), and Calcitonin, regulate Ca++ resorption, reabsorption, absorption and excretion from the bone, kidney and intestine.

Unit-IV

Chemotherapy of Microbial Diseases: General principle of chemotherapy, Sulphonamides, quinolones, pencillins, cephalosporins, aminoglycosides, protein synthesis inhibitors (tetracyclines), antimalarialdrug, drugs for amoebiasis, helminthiasis. Chemotherapy of tuberculosis, RTCP, leprosy and chemotherapy of antiviral agent including drugs for HIV infection, anticancer drugs, multidrug resistance(MDR).

Text Books:

1. Tripathi KD. Essential of medical pharmacology, New Delhi: Jaypee Brothers MedicalPublishers
2. Ghosh MN. Fundamentals of Experimental Pharmacology. Kolkata: Scientific Book Agency.
3. Kulkarni SK. Handbook of Experimental Pharmacology. New Delhi:Vallabh Prakashan.

Reference Books:

1. Rang MP, Dale MM, Riter JM. Pharmacology. New York: Churchill Livingstone.
2. Brunton LL, Lazo JS, Parker KL. Goodman and Gilman's ThePharmacological Basis of Therapeutics. New York:McGrawHill.
3. Mycek MJ, Harvey RA, Champe PC. Lipponcott's Illustrated Reviews -Pharmacology. Philadelphia: Lippincott Williams & Wilkins.

HS 401T ENVIRONMENTAL SCIENCE

Unit-I

Introduction to Environment and Biodiversity

Definition; Natural and manmade environments and inter-relationships amongst and between them, components of environment and relationship between different components, Relationship between man and environment, impact of technology on environment, environmental degradation.

Biodiversity Introduction, genetic, species and ecosystem diversity, bio-geographic classification of India, value and importance of biodiversity, threats to biodiversity,endangered and endemic species in India, conservation of biodiversity.

Unit-II

Environmental Pollution:

Air Pollution: Composition of air, structure of atmosphere,ambient air quality standards, classification of air pollutants, sources of common air pollutants like SPM, SO2, NOX, natural and anthropogenic sources, effects of common air pollutants, carbon credit.

Noise Pollution: Introduction, sources of noise pollution, ambient noise levels, effects of noise pollution on human being and wildlife, noise pollution controls,noise standards.

Water Pollution: Introduction, water quality standards, sources of water pollution, classification of water pollutants, effects of water pollutants, eutrophication, and measures to control water pollution.

Unit-III

Energy Resources: Understanding natural resources, renewable and non-renewable resources, sustainable energy resources, destruction versus conservation, forest resources, water resources, food resources, energy resources and land resources, conventional energy sources and their problems, advantages and limitations non-conventional energy sources, problems due to overexploitation of energy resources.

Unit-IV

Social Issues and Environment: Sustainable development and practices of improving environment, laws and acts for environmental protection, waste management.

Text Book:

1. Nebel BJ, Wright RT. Environmental science–the way the world works. New Jersey: PrenticeHall.

Reference Book:

1. Botkin DB, Keller EA. Environmental science. New York: John Wiley & Sons.

BPA-407P PHARMACEUTICAL ANALYSIS OF AYURVEDIC DRUGS-I

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 8/10 experiments must be performed by a student during the semester.

List of experiments:

1. To study Loss on drying of Drug.
2. To study foreign matter of Drug.
3. To studyAcid Value of Oil
4. To studyAcetyl Value of Oil.
5. Methods for analysis of raw materials and single Ayurvedic drugs.
6. To study total ash value of Drug.
7. To study acid insoluble ash value of Drug.
8. To study extractive value of Drug.
9. To studyIodine value of Oil.
10. To study acid soluble ash value of Drug.

TextBooks:

1. A textbook of *'Pharmacognosy'* by R.K.Parmar, Vol.I, Edn.-I, P.Prakashan, India.
2. Munson JW. Pharmaceutical Analysis: Modern Methods. Part A & B. New York: Marcel Dekker

Reference Books:

1. Willard HH, Merritt LL, Dean JA. Instrumental Methods of Analysis. New Delhi: CBSPublishers.
2. Ewing GW. Instrumental Methods of Chemical Analysis. Singapore: McGrawHill.
3. Schirmer RE. Modern Methods of Pharmaceutical Analysis. Vol 1&2. Pennsylvania:Franklin Book Co.
4. Kemp W.Organic Spectroscopy: London: ELBS/WH Freeman & Co.

BPA-408P PHARMACOGNOSY& PHYTOCHEMISTRY-III

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 8/10 experiments must be performed by a student during the semester.

List of experiments

1. To draw a square of 1 mm using micrometer.
2. To study focusing of camera lucida.
3. To identify various types of stomata of few drugs listed in the theory.
4. To identify various types of trichomes few drugs listed in the theory.
5. To carry out Stomatal Number and Stomatal Index of Datura.
6. To carry out Vein-islet Number of Vasaka and Datura.
7. To carry out Morphology study of Gunja, Madhucchishta.
8. To carry out Morphology study of Ardraka, Daruharidra
9. To carry out T.S. Microscopy of Vasaka, Datura leaves.etc.(drug available)
10. To carry out T.S. Microscopy of Maricha.
11. Study of Plant cells contents starch, calcium oxalate and calcium carbonate crystals.
12. To carry out extraction of volatile oils listed in the theory.
13. To prepare chemomicroscopic reagents like Glycerine–water, safranin, sudan –iii, phloroglucinol, iodine water, chloralhydrate solution etc.
14. To perform phytochemical tests for Alkaloids
15. To perform phytochemical tests for Volatile oils
16. To perform phytochemical tests for Saponins

TextBooks:

1. A textbookof*'Pharmacognosy'* by R.K.Parmar, Vol.I, Edn.-I, P.Prakashan, India.
2. Kokate CK, Gokhale SB, Purohit AP: *Parmacognosy* 36th edn. Nirali Prakashan,Pune, India.

Reference Books:

1. Evans WC (2002): *Trease and Evan's Pharmacognosy*. 15th edn., Saunder'Elsevier Pvt Ltd. New Delhi-24, India.
2. Quality Standards of Indian Medicinal Plants. New Delhi: ICMR.
3. Medicinal Plants of Himachal Pradesh by Dr. N.S.Chauhan Minerva Publications.
4. S.S. Handa Textbook of Pharmacognosy, Vallabh Publications,New Delhi.

BPA-409P BHAISHAJYA KALPNA–III

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 10/12 experiments must beperformed by a student during the semester.

List of experiments:

1. To prepare *Narikela lavana*.
2. To prepare *Arka lavana*.
3. To prepare *Hastidanta masi*.
4. To prepare *triphala masi*.
5. To prepare *Lasuna Kshirapaka*.
6. Preparation of *Ghrita*.
7. Preparation of *Taila*.
8. Preparation of *Asava*.
9. Preparation of *Aristha*.
10. Preparation of *Varti*.
11. Preparation of Vati.
12. Preparation of *Guggulu kalpana*.

Text Books:

1. Text book of Bhaishajya Kalpana Vigyana (A Science of Indian Pharmacy) by Dr. K. Ramachandra Reddy,Chaukhamba.
2. Text Book of Bhaishajya Kalpana Vigyana by Dr.Siddhinandana Mishra,Chaukhamba Sanskrit Bhawan,Varanasi.
3. Textbook of Bhaishajya Kalpana Vigyana by Dr. Santosh Kumar Mishra,Chakhambha Orientalia,Varanasi.
4. Ayurvediya Rasa Shashtra by Chandrabhuan Jha, Chaukhamba, Varanasi

Reference Books:

1. The Drugs & Cosmetics Act1940.
2. The Ayurvedic Formulary of India, Part-I&II, Govt. of India Publication.
3. The Ayurvedic Pharmacopoeia of India, Part-II, Govt.of India Publication.
4. Ayurved Sara Sangraha.
5. Rasa Tantra Saraavum Siddha Prayog Sangraha, Sri Krishan Gopal BhawanKaleda,Rajasthan.
6. Bhashajya Ratnavali

BPA-410P DRAVYAGUNA VIGYANA–IV

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

1. Knowledge of market sample and price of dravya.
2. Drug tour/field visit.
3. Description and identification of drugs mentioned in theory.
4. Genuineness test of following substances: Gaudugdha, Ghrita, Hingu, Madhu and Guda.
5. Prepare any 30 herbarium sheets of drugs mentioned in theory syllabus.

Text Books:

1. Dravyaguna vijana by Dr. Mansi Deshpandey, Chaukhamba Sanskrit Pratisnthana, NewDelhi.
2. Dravyaguna vijana Vol 1-5 by Prof.Sharma P.V; published by Chaukhambha Bharti Academy,Varanasi.

Reference Books:

1. The Wealth of India Publication and Directorate (CSIR, New Delhi)
2. Database on medicinal plants used in Ayurveda by CCRAS, New Delhi.
3. Indian Medicinal Plants by K.R. Kirtikar and B.D.Basu.
4. Medicinal Plants of Himachal Pradesh by Dr.N.S.Chauhan Minerva Publications.
5. Aushadhnaamrupa Vigyanam by Dr. Sanjeev Kumar Lale, published by Hemraj Lale Indore.

BPA 411P PHARMACOLOGY-II

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 10/12 experiments must beperformed by a student during the semester.

List of Experiments

1. Introduction to experimental pharmacology and commonly used instruments in experimental pharmacology.
2. Study of common laboratory animals and Common laboratory technique: anesthetics and euthanasia used for animal studies.
3. Dose calculation in pharmacological experiments.
4. Bioassay of oxytocin using rat uterine horn by interpolation method.
5. Bioassay of serotonin using rat fundus strip by three-point bioassay.
6. Insulin hypoglycaemic effect in rabbit
7. Anticoagulant activity was by prothrombin time and activated partial thromboplastin time tests.
8. Estimation of time of time of paralysis and time of death in *Pheretimaposthuma.*
9. Biostatistics methods in experimental pharmacology (student's t test, ANOVA)
10. Biostatistics methods in experimental pharmacology (Chi square test, Wilcoxon Signed Rank test)

Note: All laboratory techniques and animal experiments are demonstrated by simulated experiments by softwares and videos

Recommended Books (Latest Editions)

1. Rang H. P., Dale M. M., Ritter J. M., Flower R. J., Rang and Dale's Pharmacology,.Churchil LivingstoneElsevier
2. Katzung B. G., Masters S. B., Trevor A. J., Basic and clinical pharmacology, Tata Mc Graw-Hill
3. Goodman and Gilman's, The Pharmacological Basis of Therapeutics
4. Marry Anne K. K., Lloyd Yee Y., Brian K. A., Robbin L.C., Joseph G. B., Wayne A. K., Bradley R.W., Applied Therapeutics, The Clinical use of Drugs, The Point Lippincott Williams & Wilkins 5. Mycek M.J, Gelnet S.B and Perper M.M. Lippincott's Illustrated Reviews- Pharmacology.

SEMESTER-V

BPA-501T Herbal Drug Technology

Unit-I

Herbs as raw materials

Definition of herb, herbal medicine, herbal medicinal product, herbal drug preparation
Source of Herbs
Selection, identification and authentication of herbal materials
Processing of herbal raw material

Biodynamic Agriculture

Good agricultural practices in cultivation of medicinal plants including Organic farming. Pest and Pest management in medicinal plants: Biopesticides/Bioinsecticides.

Indian Systems of Medicine

a) Basic principles involved in Ayurveda, Siddha, Unani and Homeopathy
b) Preparation and standardization of Ayurvedic formulations viz Aristas and Asawas, Ghutika,Churna, Lehya and Bhasma.

Unit-II

Nutraceuticals

General aspects, Market, growth, scope and types of products available in the market. Health benefits and role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases.
Study of following herbs as health food: Alfaalfa, Chicory, Ginger, Fenugreek, Garlic, Honey, Amla, Ginseng, Ashwagandha, Spirulina

Herbal-Drug and Herb-Food Interactions: General introduction to interaction and classification. Study of following drugs and their possible side effects and interactions: Hypercium, kava-kava, Ginkobiloba, Ginseng, Garlic, Pepper & Ephedra.

Unit-III

Herbal Cosmetics

Sources and description of raw materials of herbal origin used via, fixed oils, waxes, gums colours, perfumes, protective agents, bleaching agents, antioxidants in products such as skin care, hair care and oral hygiene products.

Herbal excipients: Significance of substances of natural origin as excipients – colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors & perfumes.

Herbal formulations : Conventional herbal formulations like syrups, mixtures and tablets and Novel dosage forms like phytosomes

Unit- IV

Evaluation of Drugs WHO & ICH guidelines for the assessment of herbal drugs Stability testing of herbal drugs.

Patenting and Regulatory requirements of natural products:

a) Definition of the terms: Patent, IPR, Farmers right, Breeder's right, Bioprospecting and Biopiracy
b) Patenting aspects of Traditional Knowledge and Natural Products. Case study of Curcuma & Neem.

Regulatory Issues - Regulations in India (ASU DTAB, ASU DCC), Regulation of manufacture of ASU drugs - Schedule Z of Drugs & Cosmetics Act for ASU drugs.

Unit-V

General Introduction to Herbal Industry

Herbal drugs industry: Present scope and future prospects.
A brief account of plant based industries and institutions involved in work on medicinal and aromatic plants in India.

Schedule T – Good Manufacturing Practice of Indian systems of medicine
Components of GMP (Schedule – T) and its objectives
Infrastructural requirements, working space, storage area, machinery and equipments, standard operating procedures, health and hygiene, documentation and records.

Recommended Books: (Latest Editions)
1. Textbook of Pharmacognosy by Trease & Evans.
2. Textbook of Pharmacognosy by Tyler, Brady & Robber.
3. Pharmacognosy by Kokate, Purohit and Gokhale
4. Essential of Pharmacognosy by Dr.S.H.Ansari
5. Pharmacognosy & Phytochemistry by V.D.Rangari
6. Pharmacopoeal standards for Ayurvedic Formulation (Council of Research in Indian Medicine & Homeopathy)
7. Mukherjee, P.W. Quality Control of Herbal Drugs: An Approach to Evaluation of Botanicals. Business Horizons Publishers, New Delhi, India, 2002.

BPA-502T PHARMACEUTICAL ANALYSIS OF AYURVEDIC DRUGS–II

Unit-I

Introduction of U.V. and Visible spectrophotometry with their application in the Ayurvedic Pharmaceutical Industry and how they are helpful in the growing industry of the Ayurveda. Principle, Instrumentation of U.V. and Visible spectrophotometry.

Unit-II

Introduction to Infrared Spectrophotometry with their sample prepration by different technique and detector used in I.R. Spectrophotometry. Qualitative and quantitative applications in the field of the Ayurvedic Pharmacy.

Unit-III

Introduction of Chromatography-History, Chromatography terms, Techniques by Chromatographic bed shape, Displacement Chromatography, Techniques by physical state of mobile phase, Techniques by separation Mechanism, Special Techniques.

Unit-IV

Use of Chromatographic & Spectrophotometric methods for Standardization and evaluating quality of Ayurvedic Drugs and instrumental Analysis. Application, merits, demerits of Chromatographic & Spectrophotometric methods.

Text Books:

1. Kemp W. Organic Sepctroscopy: London: ELBS/WHFreeman&Co.
2. Munson JW. Pharmaceutical Analysis: ModernMethods.PartA &B. New York: MarcelDekker

Reference Books:

1. Willard HH, MerrittLL, DeanJA. Instrumental Methods of Analysis. New Delhi: CBSPublishers.
2. Ewing GW. Instrumental Methods of Chemical Analysis. Singapore: McGrawHill.
3. Schirmer RE. Modern Methods of Pharmaceutical Analysis. Vol1&2. Pennsylvania:Franklin BookCo.
4. Atextbookof *'Pharmacognosy'* by R.K.Parmar, Vol.I,Edn.-I,P.Prakashan,India.

BPA-503T PHARMACEUTICAL TECHNOLOGY FOR AYURVEDIC DRUGS-I

Unit-I

a). Ophthalmic preparations:

Essential characteristics, type, formulation, labeling, container of ophthalmic Products-Eyedrops, eye lotion, eye ointments, eye suspensions, contact lens solutions.

b). Packaging of pharmaceutical products: Packaging components, types and stability aspects ofpackaging, factorsinfluencing choice of containers of packaging, evaluation of packaging.

Unit-II

a). Cream: Introduction, Application, Classification, techniques used for formulation ofpharmaceutical cream, evaluation of cream.

b). Preservatives: Preservatives (Antioxidants and antimicrobial agents) used in pharmaceuticalpreparation with their concentration.

Unit-III

a). Tablet

Formulation and classification of different types of tablets, methods of formulation process of tablet(granulation), In-process qualitycontrol testing of tablets.

b). **Tablet coating:** Types of coating, equipments for coating, coating process, evaluationtests for coatingtablets.

Unit-IV

Capsules: -Hard gelatin, Soft gelatin

Advantages and disadvantages of capsule dosage form, material for production of hard gelatincapsules, size of capsules, method of capsule filling, soft gelatin, capsuleshell and capsule content, quality control testing of capsule and storage of capsule dosage forms.

TextBooks: Recent editions of the following books to be referred

1. Lachman L, Lieberman HA, Kanig JL. The Theory and Practice of Industrial Pharmacy.
2. Ansel HC. Introduction to Pharmaceutical Dosage Forms. Mumbai: Verghese&Co.
3. Thakur R. Tabular Pharmaceutics, Vol.I, Edn. I Pranav Prakashan H.P.

Reference Books:

1. Aulton ME. Pharmaceutics-The Science of Dosage Form Design. London: ELBS/Churchill Living stone.
2. Banker GS, Rhodes CT. Modern Pharmaceutics. New York: Marcel Dekker.
3. Rawlins EA. Bentley's Textbook of Pharmaceutics. London: ELBS.

BPA-504T RASA SHASTRA-I

Unit-I

Definition and etymologyof word *Rasa*, brief history of *Rasa Shastra*, fundamental principles of *Rasa-shastra*. Concept of *Rasa shala* and *Rasa mandap*, importance of *Rasaushadhi*, concept of *Rasa* & *Rasayana*.

Unit-II

Brief description of technical terminologies (*Paribhasa prakarana*)

Avapa, Nirvapa, Dhalana, Bhavana, Jarana, Murcchan, Shodhana, Marana, Varitara, Rekhapurna, Apunarbhava, Uttama, Niruttha, Amritikarana, Lohitikarana, Mrta loha, Satwa patana, Shuddhavarta, Bijavarta, Rudra bhaga and *Dhanvantari bhaga* etc.

Concept of *Shodhana, Marana* and, *Amritikarana* with their importance as per classical and modern literature.

Dravyavarga *Amlavarga, Kshiratraya, Madhuratraya, Panchamrttika, Panchagavya, Panchamrta,Ksarastaka, Dravakagana, Mitra pancaka, Raktavarga, Sweta varga, Lavanapancaka* etc.

Unit-III

Brief description of yantra and their application

Ulukhalayantra, Khalvayantra, Kachchhapa yantra Urdhwapatan yantra, Adahapatan yantra, Jaranarth tula yantra, Dola yantra, Damaru yantra, Vidhyadhara yantra, Tiryakpatana yantra, Patalayantra, Palikayantra, Putayantra, Valukayantra, Lavanayantra, Bhudhara yantra, Sthali yantra, Swedana yantra.

Unit-IV

Brief description and application of Musha (crucible) and Kosthi

Samanya Musa, Gostanimusa, Vajramusa, Maha musa, Yoga musa, Vrintak musa, Malla/pakwa musa, different types of crucibles. Satvapatana kosthi, Chullika, Patala kosthi, Gara kosthi, Angara kosthi and knowledge of various heating appliances viz. Gas stove, Hot plate and heating mantle.

Rasashala nirman (ancient and modern concept) with respect to GMP in accordance to schedule T.

Text Books:

1. Text book of Rasa Shastra by Dr. K. Ramachandra Reddy, Chaukhamba Sanskrit Bhawan, Varanasi
2. Text Book of Rasashastra by Dr. Siddhinandana Mishra, Chaukhamba Sanskrit Bhawan, Varanasi
3. Text book of Nutan Ayurvediya Rasa Shastra by Dr. Santosh Kumar Mishra, Chaukhambha Orientalia, Varanasi
4. Text book of Rasa Shastra by Dr. K. Ramachandra Reddy, Chaukhamba Sanskrit Bhawan, Varanasi.

Reference Books:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I&IIGovt.of India Publication.
3. The Ayurvedic Pharmacopoeia of India, Part-II, Govt. of IndiaPublication.

BPA-505T BHAISHAJYA KALPNA–IV

Unit-I

Pathya kalapna

Mandakalpana, Yavagu, Peya, Vilepi, Vilepiguna, Anna (Bhakta) Kalpana, Guna Of Anna kalpana, Krisara Kalpana, Guna Of Krisara, Kamblika and Khada, Raga-Sadava, Takra kalpana, Takra, Ghola, Guna Of Ghola, Mathita, Udasvit, Chacchika, Katvara, Dadhi Kurcika Takra kurcika.

Unit-II

Bahya kalpana

Lepa kalpana: *doshghna lepa, visghna lepa, varnya lepa.* Technique *of lepa* application, Time of *lepa* application, preservative of *lepa, Dasanga lepa,* example of *lepa preparation. satadhauta ghrta, sahasradhauta ghrta, malahara kalpana (maraham), sarjarasa malahara(rala malahara), siktha taila, gandhakadya malahara, atasyadi upanaha, dhupana kalpana*, ointments, creams, pastes, jellies, liniments, lotions.

Unit-III

a) Netra kalpana

Seka, aschyotana, pindi (kavalika), bidalaka, aksitarpana, putapaka, anjana.

b) Mukha kalpana

Gandusha and *kavala kalpana, snaihikag and usha kalpana, mukha paka gandusa,* indications *of Gandusa* and *kavala, pratisarana (manjan), pratisarana yoga, irimedadi taila*.

c) Nasika kalpana

Classifications of *nasya, navana nasya, avapida nasya, dhmapana nasya (pradhamana nasya),Dhuma nasya, marsa, pratimarsa nasya, nasya* drugs mentioned by different aurthors, Indications of *nasya karma*, contraindications of *nasya karma, nasya ausadhi kalpana*, procedureof *nasya karma*, determination of dosages in *nasya karma*, instructions for the patients during *nasya, nasya vyapada* (complications), advantages of adequate *nasya karma*.

Unit-IV

a) Dhumpana kalpana

Dhumanadi, dhumpana kalpana, dhumpanapascta karma, preparation *of dhumanetr*.

b) **Vasti kalpana**

Classification of *vasti kalpana*, *karma vasti-kalavasti-yoga vasti,* indications of *asthapana vasti*, contraindications of *asthapana vasti*, indications of *anuvasana vasti*, contraindications of *anuvasana vasti*, procedure of *vasti karma*, drugs commonly used for *vasti kalpa* purpose, common formulations meant for *asthapana vasti*, procedure of *vasti*, *vasti pratyagama kala*, features of *samyaka vasti*, features of *asamyaka vasti*, features of excess (*atiyoga*) *vasti*, post-*vasti* regimen,activities should be avoided after *vasti karma*, *vasti vyapada* (complications),modern aspect of enema.

Text Books:

1. Text book of Bhaishajya Kalpana Vigyana (A Science of Indian Pharmacy) by Dr.K.Ramachandra Reddy, Chaukhamba.
2. Text Book of Bhaishajya Kalpana Vigyana by Dr. Siddhinandana Mishra, ChaukhambaSanskrit Bhawan,Varanasi.
3. Text book of Bhaishjaya Kalpana Vigyana by Dr.Santosh Kumar Mishra, Chakhambha Orientalia,Varanasi.

Reference Books:

1. The Drugs & Cosmetics Act 1940.
2. TheAyurvedicFormulary of India, Part-I&IIGovt. Of India Publication.
3. TheAyurvedicPharmacopoeiaofIndiaPart-II, Govt .of India Publication.

4. Ayurved Sara Sangraha.

5. Rasa Tantra Saraavum Siddha Prayog Sangraha, SriKrishanGopal Bhawan Kaleda, Rajasthan.

HS 501 T DISASTER MANAGEMENT

UNIT-I

Introduction: Principles of Disaster Management. Natural Disasters such as Earth quake, Floods, Fire, Land slides, Tornado, Cyclones, Tsunamis, Nuclear, Chemical. Assessment of Disaster Vulnerability of allocation and vulnerable groups, National policy on disaster Management.

UNIT -II

Prevention, Preparedness and Mitigation measures for various Disasters, Post Disaster Relief &Logistics Management, Emergency Support Functions and their coordination mechanism, Resource & Material Management, Management of Relief Camp, Information systems & decision making tools.

UNIT -III

Renewable and non-renewable resources, Role of individual in conservation of natural resources for sustainable life styles. Use and over exploitation of Forest resources, Deforestation, Timber extraction, Mining, Dams and their effects on forest and tribal people.

UNIT-IV

Global Environmental crisis, Current global environment issues, Global Warming, Green house

Effect, role of Carbon Dioxide and Methane, Ozone Problem, CFC's and Alternatives, Causes ofClimate ChangeEnergyUse: Past, present and future, Role of Engineers.

TEXTBOOKS:

1. Disaster Management by G.K.Ghosh A.P.H.Publishing Corporation.
2. Environmental Studies, R Rajgopalan,Oxford University Press

REFERENCE BOOKS:

1. Disaster Management by BNarayan A.P.H.Publishing Corporation.
2. Environmental Studies, Basak, Pearson Publication.
3. Satish M. Citizen's guide to disaster management. New Delhi: Macmillan Publishers.
4. Duggal KN. Elements of public health engineering. New Delhi: SChand & Co.
5. Trivedi RK, Goel PK.Introductionto air pollution. Hyderabad: BSPublications.
6. Rao CS. Environmental pollution control engineering. New Delhi : Wiley Eastern.

BPA-506P HERBAL DRUG TECHNOLOGY

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

List of Experiments

1. To perform preliminary phytochemical screening of crude drugs.
2. Determination of the alcohol content of Asava and Arista
3. Evaluation of excipients of natural origin
4. Incorporation of prepared and standardized extract in cosmetic formulations like creams, lotions and shampoos and their evaluation.
5. Incorporation of prepared and standardized extract in formulations like syrups, mixtures and tablets and their evaluation as per Pharmacopoeial requirements.
6. Monograph analysis of herbal drugs from recent Pharmacopoeias
7. Determination of Aldehyde content
8. Determination of Phenol content
9. Determination of total alkaloids

Text Books:

1. A text book of *'Pharmacognosy'* by R.K.Parmar, Vol.I,Edn.-I,P.Prakashan,India.
2. S.S. Handa Text book of Pharmacognosy Vallabh Publications, NewDelhi.

Reference Books:

1. Evans WC (2002): *Trease and Evan's Pharmacognosy*. 15thedn., Saunder' Elsevier PvtLtd. NewDelhi-24, India.
2. Quality Standards of Indian Medicinal Plants. New Delhi: ICMR.
3. MedicinalPlantsofHimachalPradeshbyDr.N.S. Chauhan Minerva Publications.

BPA-507P PHARMACEUTICAL ANALYSIS OF AYURVEDIC DRUGS –II

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

1. To find out Rf value of different single and compound drugs by TLC method.
2. To determine paper chromatography of different single or compound drugs/formulations.
3. To determine Melting point of sulphur, borax.
4. To determine pH of different single or compound drugs/formulations.
5. To prepare standard solution.
6. To find out the Refractive index of different single or compound drugs/formulations.
7. To perform UV/Vis spectroscopy for different single or compound drugs/formulations.
8. To establish primary parameter of Ayurvedic Drugs as per API.
9. To compare standard graph of single or compound Ayurvedic drugs by UV/Vis.
10. To find out optical rotation of single or compound Ayurvedic drugs sample.

Text Books:

1. Kemp W. Organic Sepctroscopy: London: ELBS/WHFreeman&Co.
2. Munson JW. Pharmaceutical Analysis: Modern Methods. Part A & B. New York:Marcel Dekker

ReferenceBooks:

1. Willard HH, Merritt LL, Dean JA. Instrumental Methods of Analysis. NewDelhi: CBSPublishers.

2. Ewing GW. Instrumental Methods of Chemical Analysis. Singapore: McGrawHill.

3. Schirmer RE. Modern Methods of Pharmaceutical Analysis.Vol1&2. Pennsylvania: FranklinBook Co.

4. A text book of *'Pharmacognosy'* by R.K.Parmar, Vol.I, Edn.-I, P.Prakashan,India.

BPA-508P PHARMACEUTICAL TECHNOLOGY FOR AYURVEDIC DRUGS-I

Note:

Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 10/12 experiments must beperformed by a student during the semester.

List of experiments:

1. Preparation and evaluation of granules by wet Granulation techniques.
2. Preparation and evaluation of Herbal Cream**.**
3. Filling of Ayurvedic capsule by Hand operated capsule filling machine.
4. To determine the Weight variation of single or compound Ayurvedic tablets.
5. To determine the friability of single or compound Ayurvedic tablets by Roche friabilator apparatus.
6. To determine the disintegration time of single or compound Ayurvedic tablets.
7. To determine the Weight variation of single or compound Ayurvedic capsules.
8. To determine the disintegration time of single or compound Ayurvedic capsules.
9. To determine the Hardness of Ayurvedic tablets by Monsanto hardness tester.
10. To determine the inprocess quality control testing of single or compound tablet.

Text books: Recenteditionsofthefollowingbookstobereferred

1. Lachman L, Lieberman HA, Kanig JL. The Theory and Practice of Industrial Pharmacy.
2. Ansel HC. Introduction to Pharmaceutical Dosage Forms. Mumbai:Verghese&Co.

ReferenceBooks:

1. Aulton ME. Pharmaceutics-The Science of Dosage Form Design. London:ELBS/Churchill Living stone.
2. Banker GS, Rhodes CT. Modern Pharmaceutics. New York: MarcelDekker.
3. Rawlins EA. Bentley’s Textbook of Pharmaceutics. London : ELBS.

BPA-509P RASASHASTRA-I

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

List of experiments:

1. To study and the working and principle of *Dola yantra*.
2. To study and the working and principle of *Ulukhala yantra*.
3. To study and the working and principle of *Khalva yantra*.
4. To study and the working and principle of *Palika yantra*.
5. To study and the working and principle of *Valuka yantra*.
6. To study the identification of different Heat appliances used in Ayurvedic Drug preparation.
7. To study the Plan of Pharmacy.
8. To study the practical aspect of *Shodhana*.
9. To study the practical aspect of *Bhavna* and *mardana*.
10. To study the various classical tests and parameters of available sample of *Bhasma*.

TextBooks:

1. Text book of Rasa Shastra by Dr.K. Ramachandra Reddy, Chaukhamba Sanskrit Bhawan,Varanasi
2. Text Book of Rasa Shastra by Dr. Siddhinandana Mishra ,Chaukhamba Sanskrit Bhawan,Varanasi
3. Text book of Nutan Ayurvediya RasaShastra by Dr. Santosh Kumar Mishra, ChakhambhaOrientalia, Varanasi

ReferenceBooks:

1. TheDrugs&CosmeticsAct1940.
2. The Ayurvedic Formulary of India, Part-I&IIGovt.of India Publication.
3. The Ayurvedic Pharmacopoeia of IndiaPart-II, Govt.of India Publication.
4. Ayurved SarSangraha.
5. RasaTantraSara avum Siddha Prayog Sangraha, SriKrishan Gopal Bhawan Kaleda, Rajasthan.

BPA-510P BHAISHAJYA KALPNA–IV

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

1. To prepare different *Pathya Kalpana*.
2. To prepare *Dashanga lepa*.
3. To prepare *Siktha taila*.
4. To prepare *Hingulamrita malhara*.
5. To prepare *Sarjrasa malhara*.
6. To prepare *Shatdhauta ghrita*.
7. To prepare *Anuvasna Vasti*.
8. To prepare *Asthapana Vasti*.
9. To prepare *Dant manjana*.
10. To prepare Ayurvedic *facepack*.

Text Books:

1. Textbookof Bhaishajya Kalpana Vigyana (A Science of Indian Pharmacy) byDr.K. Ramachandra Reddy, Chaukhamba.
2. Text book of Bhaishajya Kalpana Vigyana by Dr. Siddhinandana Mishra,Chaukhamba Sanskrit Bhawan, Varanasi.
3. Text book of Bhaishajya Kalpana Vigyana by Dr. Santosh Kumar Mishra,Chakhambha Orientalia, Varanasi.

Reference Books:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I&IIGovt.of IndiaPublication.
3. The Ayurvedic Pharmacopoeia of IndiaPart-II,Govt. of India Publication.
4. Ayurved Sara Sangraha.
5. Rasa Tantra Saraavum Siddha Prayog Sangraha, Sri Krishan Gopal BhawanKaleda, Rajasthan.

SEMESTER-VI

BPA-601T PHARMACOKINETICS AND BIOPHARMACEUTICS

Unit-I

a.) Introduction: Introduction to biopharmaceutics and pharmacokinetics, Fate of drug in the body. Experimental models of pharmacokinetics studies, schematic representation of pharmacokinetic process and drug therapeutics.

b.) Absorption: Mechanism of drug absorption (passive diffusion, active transport, facilitated diffusion and pinocytosis), factors influencing GI absorption of drug-pharmaceutical and patient related factors.

Unit-II

Pharmacokinetics: **Basic consideration and Non Linear Pharmacokinetics:**

a.) Pharmacokinetics-Basic Considerations: Significance of plasma drug concentration time profile, volume of distribution and distribution coefficient, pharmacokinetics parameters classification of pharmacokinetics models.

b.) Non Linear Pharmacokinetics: Causes of non-linearity, Michaelis-Menten equation, determination of Vmax and Tmax.

Unit-III

Biopharmaceutics: Bioavailability and Bioequivalence:

a.) Bioavailability: Objective, consideration and measurement of bioavailability by bothmethods pharmacokinetics and pharmacodynamic methods, Biopharmaceutics drugs classification System, Method of enhancement of bioavailability.

b.) Bioequivalence: Objective, Application of Bioequivalance Studies, general principles of bioequivalence, Criteria for bioequivalence requirement, Methodology for bioequivalence studies: - Objectiveof study, Study Subjects, Study design and conduct of study.

Unit-IV

a.) Drug Excretion: Concept of clearance, mechanism of renal clearance, clearanceratio, hepatic clearance.

b.) Dissolution: - Concept of dissolution, Theories of dissolution, in-vitro drug dissolutiontesting models, invitro sink condition and its role and Invitro-in vivo correlations.

TextBooks: Recenteditionsofthefollowingbookstobereferred

Brahmankar DM, Jaiswal SB. Biopharmaceutics and Pharmacokinetics –A Treatise.NewDelhi: Vallbah Prakashan.

Gibaldi M. Biopharmaceutics & Pharmacokinetics. NewYork: Lea&Febiger.

ReferenceBooks:

Rowland Mand Tozer TN. Clinical Pharmacokinetics: Concept & Application. New York: Lea&Febiger.

Swarbrick J. Biopharmaceutics. NewYork: Lea&Febiger.

Shargel L. Applied Biopharmaceutics & Pharmacokinetics. Singaproe: McGrawHill.

BPA-602T PHARMACOLOGY & TOXICOLOGY OF AYURVEDIC DRUGS-1

Unit-I

General introduction to pharmacology and its role in the field of Ayurveda. Nature and source of drugs. Routes of drug administration such as intravenous, intra-muscular, intra-theccal, intra- dermal, intranasal, intrarectal, subcuteanous, intra-arterial, intra-spinal, intra-articular, intra- ocular etc. Mechanism of Drug transport (active and passive) and storage.

Unit-II

Pharmacology of Cardiovascular System: Digitalis and cardiac glycosides, Antihypertensive drugs, Antianginal and Vasodilator drugs including calcium channel blockers and beta adrenergicantagonists, Antiarrhythmic drugs, Antihyper lipedemic drugs, Drugs used in the therapy of shock.

Unit-III

Steroids and Related Drugs: ACTH, corticosteroids, Androgens and anabolic steroids, Estrogens, progesterone and oral contraceptives, Drugs acting on the uterus. Drugs Acting on Urinary System: Fluid and electrolyte balance, Diuretics.

Unit-IV

Type of drugs for the treatment of GI tract diseases. Appetizers, Digestants, Carminatives, Emetics, Anti-emetics,Laxative & Anti-diarrhoeal, Pharmacotherapy of peptic ulcer. General principles of clinical toxicology includinginsecticide poisoning, heavy metal poisoning, barbiturate poisoning, narcotic drug poisoning.

TextBooks:

1. Tripathi KD. Essential of medical Pharmacology, NewDelhi: Jaypee Brothers Medical Publishers,
2. Ghosh MN. Fundamentals of Experimental Pharmacology. Kolkata: Scientific Book Agency.
3. Kulkarni SK. Handbook of Experimental Pharmacology.NewDelhi: Vallabh Prakashan.

ReferenceBooks:

1. Rang MP, Dale MM, Riter JM. Pharmacology. NewYork: Churchill Living stone.
2. BruntonLL, Lazo JS , Parker KL. Goodman and Gilman's The PharmacologicalBasis of Therapeutics. New York: McGraw Hill.
3. Mycek MJ, Harvey RA, Champe PC. Lipponcott's Illustrated Reviews -Pharmacology. Philadelphia: Lippincott Williams & Wilkins
4. Nimmy VS, Praveen Kumar KS. Handbook of Pharmacology for Ayurveda Students". Chaukhamba Visvabharati, Varanasi, India.
5. P. Mallikarjuna R. Illustrated Agada Tantra (Handbook of Ayurvedic Toxicology). Chaukhamba Orientalia, Varanasi, India.

BPA-603T RASA SHASTRA-II

Unit-I

Definition and types of Puta: Surya puta, Candra puta, Govara puta, Lawaka puta, Kukkutaputa, Kapota puta, Varaha puta, Gaja puta, Maha puta, Kumbha puta, Baluka puta, Bhudharaputa, Laghuputa.

Unit-II

Knowledge of Parada, synonyms, occurrence, natural and artificial sources of Parada, Hingulad parade extraction, typesofrasa classification of Rasa dravya, naisargika, yougika, aupadhika (kanchuka) etc Parada dosa and characteristics of Grahya-Agrahya Parada, Samanya and vishesha shodhana of Parada, Parada astasamskara (aim, instruments, ingredients, method), Parada gati, parad vikar and prashaman and Rasa bandha.

Unit-III

Murchhana and Jarana of Parada, Preparation & examination of Kajjali, types of ras ausadhis, knowledge of khalviya rasayana e.g. Tribhuvana kirthi rasa, Sutsekhar rasa, Parpati kalpa, Rasaparpati, Tamraparpati, Gagan Parpati, Kupipakva rasayan-rasakarpura, Rasa sindhura, Samirapannaga rasa, Siddha Makard hwaja, Shila Sindoor, Tamra Sindoor, Swarna Vanga, Pottali kalpa-Hemagarbha pottali.

Unit-IV

Applications of Electric muffle furnace and fuel (diesel) dependant furnace.Brief introduction of Quality Control, Standarization & GMP's of Rasa aushadhis.

Text Books:

1. Text Book of Rasa Shastra by Dr. Siddhinandana Mishra, ChaukhambaS anskrit Bhawan,Varanasi
2. Text Book Nutan Ayurvediya Rasa Shastra by Dr. Santosh Kumar Mishra, ChakhambhaOrientalia, Varanasi
3. Ayurvediya Rasa Shashtra by Dr. Chandrabhushan Jha, Chaukhamba,Varanasi
4. Text Bookof Rasa Shastra by Dr.K. Ramachandra Reddy, Chaukhamba Sanskrit Bhawan,Varanasi

ReferenceBooks:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I&II Govt. Of India Publication.
3. The Ayurvedic Pharmacopoeia of India Part-II, Govt. of India Publication.
4. Ayurved Sara Sangraha. Rasa Tantra Saraavum Siddha Prayog Sangraha, Sri Krishan GopalBhawan Kaleda, Rajasthan

BPA-604T PHARMACEUTICAL TECHNOLOGY FOR AYURVEDIC DRUGS-II

Unit-I

Sustained release formulation:

Objectives, advantage & limitation of sustained release tablets, Classification of Sustained release formulations, factors consideration such as physiological properties and biological properties and techniques for preparing sustained release formulations, evaluation of sustained release tablets.

Unit-II

Liposomes:-Introduction, therapeutic application, classification of liposomes, method ofLiposomes preparation and drug loading, characterization of liposomes, factors affecting liposomes, stability of liposome including accelerated stability testing, evaluation of liposomes, commercial manufacturing and scale up of liposomes.

Unit-III

a) Microsphere:

Types of Microsphere, polymer used factors consideration for the preparation ofmicrosphere, objective of microsphere, different techniques used to formulation of microsphere.

b) **Phytosome:** Introduction, properties, advantages of phytosomes, method of preparation, and characterization ofphytosomes and pharmaceutical applications of Phytosome.

Unit-IV

a) Standardization of Herbal drugs:

Standardization parameters, quality assurance and stability testing of Herbal drugs as per WHO/ICH guideline sapplicable to the various herbal drugs.

b) **Quality control test of Herbal drugs:-**Inprocess quality control test for Ayurvedic tablet, Ayurvedic capsule, injectables and liquid orals (monophasic and biphasic).

TextBooks: Recent editions of the following books to be referred

1. Jain NK. Novel and Drug Delivery Systems, New Delhi: CBS Publishers.
2. Aulton ME. Pharmaceutics: The Science of Dosage Form Design. London: ELBS/Churchill Living stone.
3. Thakur R. Tabular Pharmaceutics, Vol.I ,Edn.I Pranav Prakashan H.P.

BPA-605T ADVANCED PHARMACOGNOSY

Unit-I

a) Introduction to the Study of mevalonic and shikimic acid pathways with special reference to the biosynthesis of: Tropane alkaloids and Terpenoids.

b) Enzymes, its classification and Study of Biological sources, preparation and uses of the following enzymes: Papain, pepsin and pancreatin.

Unit-II

a) Brief introduction to plant tissue culture techniques-Micropropagation, hairy root culture, root and shoot tip culture etc. including nutritional requirements and applications of plant tissue culture.

b) Phytochemical Screening: Preparation of extracts and Screening of alkaloids, saponins, cardiac glycosides, flavonoids, tannins and polyphenols, anthraquinones, amino acids inplant extracts

Unit-III

a) Basic introduction to different classes of plant growth regulators like auxins, cytokinins, gibberellins, abscisic acid and their physiological role. Concept of animal ethical committee and its guidelines.

b) Study of Plant pesticides including rodenticides, nematicides, insecticides, fungicides.Herbs as health foods.

Unit-IV

a) Study and applications of TLC, paper chromatography, column chromatography, Gas,HPLC, centrifugal partition chromatography.

b) Quality control of crude drugs: Adulteration of crude drugs and their detection byorganoleptic, microscopic, physical, chemical and biological methods and properties.

TextBooks:

1. A textbookof *'Pharmacognosy'* by R.K. Parmar, Vol.I, Edn. -I,P.Prakashan,India.

2. S.S Handa Textbook of Pharmacognosy Vallabh Publications, NewDelhi.

ReferenceBooks:

1. Evans WC (2002): *Trease and Evan's Pharmacognosy*. 15thedn., Saunder' Elsevier Pvt Ltd. NewDelhi-24, India.

2.Quality Standards of Indian Medicinal Plants.NewDelhi: ICMR.

3.Medicinal Plants of India. New Delhi: ICMR.

4. Medicinal Plants of Himachal Pradesh by Dr.N.S. Chauhan MinervaPublications.

BPA-606T MEDICINAL CHEMISTRY

Unit-I

Drug Metabolism

Introduction: Xenobiotics and general pathways of drug metabolism; Phase-I(Functionalization) and Phase-II(Conjugation).

Phase-I

Oxidative Reactions and Reductive Reactions with complete study of cytochrome P-450 andFlavin monoxygenases electron transport system.

Phase-II

Conjugation during drug metabolism like Glucuronic acid conjugation, sulphate conjugation, aminoacid conjugation, glutathione conjugation, acetylconjugation and methylconjugation.

Unit-II

Antibiotic and Antimicrobial Agents

The following topics shall be treated covering chemical naming, structure activity relationship, mode of action, Nomenculature, classification, antimicrobial spectrum, drug resistance, andsynergism and uses. The emphasis would be only on B.P. and I.P.compounds.

a) General considerations with Sulphonamides and other synthetic antimicrobialagent's.
b) Disinfectants and Antiseptics.

Unit-III

a) Aminoglycosides and otherantibiotics effective mainly against Gram–negative organisms.
b) Penicillins and other antibiotics effective mainly against Gram–negative organisms.

Unit-IV

a) Antineoplastic agent and Antiviral agents- Introduction to DNA, RNA and retroviruses, viral replication, interferone.
b) Cephalosporins, Tetracyclines and other antibiotics effective against both gram+positive andgram – negative organisms.

TextBooks:

1. Foye WC. Principles of Medicinal Chemistry. Philadelphia: Lea&Febiger. BealeJM, BlockJH.
2. Wilson and Gisvold's Textbook of Organic Medicinal and Pharmaceutical Chemistry. Philadelphia:Lippincott Williams and Wilkins.

ReferenceBooks:

3. Hansh C. Comprehensive Medicinal Chemistry –Quantitative Drug Design. Vol. IV. Oxford:Pergamon Press.
4. Jurs PC. Computer Software Application in Chemistry.NewYork: JohnWiley &Sons.
5. Pops and Perruns.Computer Aided Drug Design.NewYork:AcademicPres

BPA- 607P PHARMACEUTICAL TECHNOLOGY FOR AYURVEDIC DRUGS-II

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

List of experiments:

1. To determine the dissolution of sustained release tablets.
2. To determine the dissolution of marketed ayurvedic tablets.
3. To determine the dissolution of marketed ayurvedic capsules.
4. Formulation and evaluation of Microsphere.
5. Formulation and evaluation of shampoo.
6. Formulation and evaluation of herbal shampoo.
7. To determine the dissolution of single or compound Ayurvedic drugs/ film coatedtablets.
8. To determine the dissolution of single or compound Ayurvedic drugs /enteric coated tablets.
9. To determine the disintegration time of enteric coated tablets.
10. To determine the disintegration time of sugar coated tablets.

TextBooks: Recenteditionsofthefollowingbookstobereferred

1. Jain NK. Novel and Drug Delivery Systems, NewDelhi: CBS Publishers.
2. Aulton ME. Pharmaceutics: The Science of Dosage Form Design. London: ELBS /Churchill Living stone.

ReferenceBooks:

1. Robinson R, Lee VHL. Novel Drug Delivery Systems. NewYork: MarcelDekker
2. Carter SJ. Cooper & Gunn's Tutorial Pharmacy.NewDelhi:CBSPublishers.
3. Bean HS, Becket AH, Carless JE. Advances in Pharmaceutical Sciences. Vol. 5.London: Academic Press.

BPA-608P ADVANCED PHARMACOGNOSY

Note:

Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 10/12 experiments must beperformed by a student during the semester.

List of experiments

1. To carry out extractive value of some drugs listed in API
2. To carry out Refractive index of some Ayurvedic drugs listed inAPI.
3. To prepare TLC plates by various methods.
4. To carryout TLC studies of some Ayurvedic drugs/ formulations/ volatile oil setc. Listedin API
5. To carry out florescence analysis of some Ayurvedic crude drugs/extracts.
6. To carry out chemical test of Alkaloids.
7. To carry out chemical test of Steroids.
8. To carry out test for Saponins.
9. To carry out chemical test for Flavonoids.
10. To carry out chemical test for Tannins.
11. To carry out foreign matter analysis, Loss on drying, Swelling and Foaming index ofsome drugs listed in API.
12. To carry out isolation of volatile oil and carry out solubility test, refractive index,TLCprofile of the oil obtained camphor, eucalyptus oil.
13. To study different labels pertaining to Ayurvedic and Modern dosage forms.

TextBooks:

1. A text book of *'Pharmacognosy'* by R.K. Parmar, Vol.I,Edn.-I,P.Prakashan,India.

2. Kokate CK, Gokhale SB, Purohit AP: *Parmacognosy* 36thedn. Nirali Prakashan, Pune, India.

ReferenceBooks:

1. Evans WC (2002): *Trease and Evan's Pharmacognosy*. 15thedn., Saunder' Elsevier Pvt Ltd. NewDelhi-24, India.
2. Quality Standards of Indian Medicinal Plants. NewDelhi: ICMR.
3. Medicinal Plants of India. NewDelhi: ICMR.
4. Medicinal Plants of Himachal PradeshbyDr.N.S. Chauhan Minerva Publications.
5. S.S Handa Textbook of Pharmacognosy Vallabh Publications, NewDelhi.

BPA-609P RASA SHASTRA-II

Note:

Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 10/12 experiments must beperformed by a student during the semester.

List of experiments:

1. To extract *Parada* (Mercury) from its ore Hingula by classical *Kanduka Yantra* method.
2. To prepare *Kajjali* and its examination.
3. To prepare *Rasa Parpati*.
4. To prepare *Shweta Parpati*.
5. To perform the *swedana* process of *parada*.
6. To perform the *mardana* process of *parada*.
7. To perform the *murchhana* process of *parada*.
8. To perform the *uthhapana* process of *parada*.
9. To perform the *patana* process of *parada*.
10. To perform the *bodhana* process of *parada*.
11. To perform the *niyaman* process of *parada*.
12. To perform the *deepana* process of *parada*.
13. To prepare *bhasma* and its examination

Text Books:

1. Text book of Rasa Shastra by Dr.K. Ramachandra Reddy, Chaukhamba Sanskrit Bhawan,Varanasi.
2. Text Book of Rasa Shastra by Dr. Siddhinandana Mishra, Chaukhamba Sanskrit Bhawan,Varanasi.
3. Text book Nutan Ayurvediya Rasa Shastra by Dr. Santosh Kumar Mishra, ChakhambhaOrientalia, Varanasi.
4. Ayurvediya Rasa Shashtra by Dr. Chandrabhushan Jha, Chaukhamba, Varanasi.

ReferenceBooks:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I&II Govt.of India Publication.
3. The Ayurvedic Pharmacopoeia of IndiaPart-II,Govt. of India Publication.
4. Ayurved Sara Sangraha.
5. Rasa Tantra Saraavum Siddha Prayog Sangraha, SriKrishan Gopal Bhawan Kaleda, Rajasthan.

Industrial Training *

*Industrial training (Desirable): Every candidate shall be required to work for at least 150 hours spread over four weeks in a Ayurvedic/ Pharmaceutical Industry. It includes Production unit, Quality Control department, Quality Assurance department, Analytical laboratory, Manufacturing unit, R&D, Ayurvedic Hospital, Clinical Research Organization, Community Pharmacy, etc. after Semester – VI and before the commencement of Semester –VII, and shall submit satisfactory report of such work and certificate duly signed by the authority of training organization to the head of the institute. That will be evaluated in the VII semester.

SEMESTER-VII

BPA-701T PHARMACEUTICAL JURISPRUDENCE & PHARMACEUTICAL MANAGEMENT

Unit-I

Forensic Pharmacy -Acts, Rules & Regulations –
Code of pharmaceutical Ethics:-Introduction, code, pharmacist, in relation to his job, trade, his profession, pharmacist oath.
The Drugs and Cosmetics Act and rules:-Introduction, definition, schedule to act and rule, import and registration of drugs and cosmetics, manufacturing of drug specified in schedule C, Provisions applicable to Ayurvedic (includingSidha), Unani and homeopathic drugs.
The Pharmacy Act:-Introduction, definition, PCI, State pharmacy councils, Registration of pharmacist.

Unit-II
Narcotic drugs and psychotropic substances:-Introduction, definition, authorities,prohibition, control and regulation, offences and penalities, import, export of narcotics and drugs and Psychotropic drugs.
Preparation of Drug lists - High Risk drugs, Emergency drugs, Schedule H1 drugs, NDPS drugs, reserved antibiotics

Unit III
Medication errors: Definition, types, consequences, and strategies to minimize medication errors, LASA drugs and Tallman lettering as per ISMP.
FEFO, FIFO methods

Unit-IV
Pharmaceutical Management: -
Management and its Principles: -Characterstics, importance, levels and function of management, scientific management, principles of management, coordination, communication, motivation and leadership quality of management.
Personnel Management: - Objective, function of personnel management, recruitment, selection process, service condition, performance evaluation of personnel management.

Unit-V
Channels of Distribution: Direct and indirect selling, types of middle man, wholesalers, retailers, modern trends in retailing, retail departmental store, chain stores, mail order busines. **Pharmacist: -**Recruitment, training, evaluation and compensation to the pharmacist.

Text Books: Recenteditionsofthefollowingbookstobereferred

1. Jain, NK. Text book of Forensic Pharmacy.New Delhi: Vallabh Prakashan.
2. Mehta RM. Pharmaceutical Production Management. New Delhi: Vallabh Prakashan

ReferenceBooks:

1. Kotler P, Armstrong. Principles of Marketing. NewDelhi: PHI Learning Pvt Ltd
2. Wadedhra BL. Law Relating to Patents, Trademarks, Copyright Design and Geographical Indications.New Delhi: Universal Law Publishing.
3. Bansal P. IPRH and book for Pharma Students and Researchers. Hyderabad: Pharma Book Syndicate.

BPA-702T PHARMACEUTICAL MICROBIOLOGY

Unit-I

Introduction, History and Scope of Microbiology, Microscopies, their magnification, resolution, illumination and filters, working of different types of microscopes (simple, compound, eclectron), micrometry.

Unit-II

Classification of microbes and their taxonomy– Protozoa, fungi, actinomycetes, bacteria, ricketssia spirochaetes and viruses. Nutrition, cultivation, isolation and identification of bacteria, actnomycets, fungi, viruses. Bacterial enzymes.

Unit-III

Control of microbes by physical and chemical methods. Disinfection, factors influencing disinfection, disinfectants and antiseptic and their evaluation.

Sterilization, different methods, evaluation of sterilization methods. Sterility testing of Pharmaceutical products.

Unit-IV

Microbial attach and host defence, virulence and pathogenicity, primary and specificdefensivemechanisms of body (humoral and cell mediated), infection and its transmission, interferon's. Applications of microbiology in Ayurvedic Pharmacy.

TextBooks:

1. Hugo and Russel.Pharmaceutical Microbiology. Oxford: Balckwell.
2. Pelczar PC. Microbiology. New Delhi: Tata Mc Graw Hill.

ReferenceBooks:

1. Ananthanarayan A, Panickar J. Textbook of Microbiology.Hyderabad: Orient Longman.
2. Prescott LM, Harley GP, Klein DA. Microbiology. Oxford:VC Brown Publishers.
3. Indian Pharmacopoeia. New Delhi: Controller of Publications.

BPA-703T PHARMACOLOGY & TOXICOLOGY OF AYURVEDIC DRUGS–II

Unit-I

Drugs used in the treatment of Respiratory tract disorders. Pharmacotherapy of cough. Pharmacotherapy of bronchial asthma and related airway inflammations. Ayurvedic approach for the treatment of Asthma.

Unit-II

Drugs used in the treatment of cardiovascular system. Pharmacotherapy of hypertension. Pharmacotherapy of arrhythmia. Pharmacotherapy of cardiac failure. Pharmacotherapy of anginapectoris.

Unit-III

Immunology and Immunological Preparations: Principles, antigens and haptens, immune system, cellular humorai immunity, immunological tolerance, antigen-antibody reactions and their applications. Hypersensitivity, Active and passive immunization; Vaccines- their preparation, standardization and storage.

Unit-IV

Steroids and related drugs: Steroidal nomenclature and stereochemistry, androgens and anabolicagents, estrogens and progestational agents, adrenocorticoids. Concept of Essential Drugs and Rational Drug use. Drug Addiction and Drug Abuse

TextBooks:

1. Tripathi KD. Essential of Medical Pharmacology, New Delhi: Jaypee BrothersMedical Publishers,
2. Ghosh MN. Fundamentals of Experimental Pharmacology. Kolkata: Scientific Book Agency.
3. Kulkarni SK. Handbook of Experimental Pharmacology. New Delhi: Vallabh Prakashan.

ReferenceBooks:

1. Rang MP, Dale MM, Riter JM. Pharmacology. New York: Churchill Livingstone.
2. Brunton LL, Lazo JS, Parker KL. Goodman and Gilman's The Pharmacological Basis of Therapeutics. NewYork: Mc Graw Hill.
3. Mycek MJ, Harvey RA, Champe PC. Lipponcott's Illustrated Reviews -Pharmacology. Philadelphia: Lippincott Williams & Wilkins.
4. Nimmy VS, Praveen Kumar KS. Handbook of Pharmacology for Ayurveda Students. Chaukhamba Visvabharati, Varanasi, India.
5. P. Mallikarjuna R. Illustrated Agada Tantra (Handbook of Ayurvedic Toxicology). Chaukhamba Orientalia, Varanasi, India.

BPA-704T INSTRUMENTAL METHODS OF ANALYSIS

Unit-I

Introduction of Spectroscopy

Nature of electro magneticradiations, the interaction between energy and matter, application of quantum mechanic theory, the absorption of energy by atoms and molecules, the emission of radiant energy by atoms and molecules; Applications in Pharmaceutical Industry.

Ultraviolet and visible spectrophotometry:

Electronic excitation, quantitative laws, deviations from Beer's law, graphical presentation of data, chromophores, photometric error, instrumentation (light sources, prism and grating monochromators, photomissive and photomultiplier tubes), applications (direct and indirect methods, analysis of mixture).

Unit-II

Flame Photometry:

Theory, quantitative description, experimental factors affecting fluorescence intensity, relationship of fluorescence structure, instrumentation (cell, light sources, wavelength selection and detectors), pharmaceutical applications.

Unit-III

a) Infrared spectrophotometry:

Theory, characteristic absorption bands of organic functional groups, Frequency range, bandwidth and scan speed, concentration range and absorbance value, preparation of sample, sample cell, IR instrumentation, (lightsources, monochromatic detector), qualitative and quantitative applications in pharmaceutical analysis.

b) Introduction of Atomic absorption spectroscopy and applications of these techniques in the field of Ayurveda.

Unit-IV

Techniques by Chromatographic bed shape 1. Column Chromatography 2. Planar Chromatography, Displacement Chromatography, Techniques by physical state of mobile phase-

1. Gas Chromatography 2. Liquid Chromatography.

Text Books:

1. Lee, DC. Pharmaceutical Analysis. London: Blackwell.
2. Munson J W. Pharmaceutical Analysis: Modern Methods. Part A& B.New York: Marcel Dekker

Reference Books:

1. Willard HH, Merritt LL, Dean JA. Instrumental Methods of Analysis. NewDelhi:CBSPublishers.
2. Ewing GW. Instrumental Methods of Chemical Analysis.Singapore: McGraw Hill.
3. Schirmer RE. Modern Methods of Pharmaceutical Analysis.Vol 1 & 2. Pennsylvania: Franklin Book Co.

KempW.Organic Sepctroscopy: London: ELBS/WHFreeman & Co.

BPA-705T RAS SHASTRA-III

Unit-I

a) Maharasa

Identification, synonyms, occurence, properties, grahya- agrahya lakshna, samanya-vishesh shodhana, marana, dose, therapeutic uses and phamacopoieal standards of bhasma of following maharasa: Abhraka, Vaikranta, Makshika, Vimala, Shilajatu, Sasyaka, Chapala and Rasaka.

b) Uparasa

Identification, synonyms, occurrence, properties, grahya-agrahya lakshna, samanya-vishesh shodhana, marana, dose, therapeutic uses and phamacopoieal standards of bhasma of following uprasa: Gandhaka, Gairaika, Kasisa, Kanksi, Haratala, Manahsila, Anjana and Kankustha.

Unit-II

Sadharana Rasa

Identification, synonyms, occurrence, properties, grahya-agrahya lakshna, samanya-vishesh shodhana, marana, dose, therapeutic uses and phamacopoieal standards of bhasma of following sadharana rasa: Kampillaka, Gauri Pashana, Navasadara, Kaparda, Mrddarasrnga, Agnijara, GiriSindura and Hingula.

Unit-III

Dhatu

Identification, synonyms, occurence, properties, grahya-agrahya lakshna, samanya-vishesh shodhana, marana, dose, therapeutic uses and phamacopoieal standards of bhasma of following: **Suddha Loha**: Swarna, Rajata, Tamra, Loha, Mandura, **Putiloha**: Naga, Vanga, Yashada,**Mishra Loha**: Kamsya, Pittala,Varta Loha.

Unit-IV

Ausadhi Yoga Gyanam

Ingredients, manufacturing process, therapeutic doses and therapeutic uses of followings compound formulations**:** Arogya Vardhini gutika, Karpura rasa, Kasturi bhairava rasa, Kumarakalyana rasa,Garbhapala rasa, Candraprabha vati, Candramrta rasa, Pratapalankeswara rasa,Pravala Pancamrta rasa, Anandbhairava rasa,Yogendra rasa, Rajamrganka rasa, Rambana rasa,Laxmivilasa rasa,Vasanta Kusumakara rasa.

TextBooks:

1. Text Book of Rasa Shastra by Dr. Siddhinandana Mishra, Chaukhamba Sanskrit Bhawan,Varanasi.
2. Text Book of Rasa Shastra by Dr. SiddhinandanaMishra, Chaukhamba Sanskrit Bhawan,Varanasi.
3. Textbook Nutan Ayurvediya Rasa Shastra by Dr. Santosh Kumar Mishra, ChakhambhaOrientalia, Varanasi.
4. Ayurvediya Rasa Shashtra by Dr. Chandrabhushan Jha, Chaukhamba, Varanasi
5. Textbook of Rasa Shastra by Dr.K. Ramachandra Reddy, Chaukhamba SanskritBhawan,Varanasi.

Reference Books:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I & II Govt.Of India Publication.
3. The Ayurvedic Pharmacopoeia of India Part-II, Govt. of India Publication.
4. Ayurved Sara Sangraha.
5. Rasa Tantra Saraavum Siddha Prayog Sangraha, SriKrishan Gopal Bhawan Kaleda, Rajasthan.
6. Rasa Ratna Samuchaya by Vagbhatt, Chaukhamba, Varanasi

HS-701T HUMAN VALUES AND PROFESSIONAL ETHICS

Unit I

Introduction- Need, Basic Guidelines, Content and Process for Value Education.

Understanding the need, basic guidelines, content and process for Value Education
Self Exploration-what is it?-its content and process;Natural Acceptance
Continuous Happiness and Prosperity- A look at basic Human Aspirations
Right understanding.
Understanding Happiness and Prosperity correctly- A critical appraisal of the current status.

Unit II

Understanding Harmony in the Human Being- Harmony in Myself

Understanding human being as a co-existence of the sentient T and the Material'Body'
Understanding the needs of Self (T) and 'Body*-Sukh and Suvidha
Understanding the Body as an instrument of T (I being the doer, seer and enjoyer)
Understanding the characteristics and activities of Tand harmony inT

Unit III

UnderstandingHarmonyintheFamilyandSociety-HarmonyinHuman-HumaRelationship

Understanding harmony in the Family-the basic unit of human interaction
Understanding values in human-human relationship: meaning of Nyaya and Program for its fulfillmentto ensure Uhhay-tripfi: Trust(Vishwas)and Respect {Sammanjas the foundation values of relationship
Understanding the meaning of Vishwas; Difference between intention and competence

Unit IV

Understanding Harmony in the Nature and Existence-Whole existence as Co existence

Understanding the harmony in the Nature interconnectedness and mutual fulfillment among the four orders of nature–Recyclability andself-regulation in nature.
Understanding Existence as Co-existence(Sah-asfitva) of mutually interacting units in All pervasive space

Text Books:

1. The textbook: R RGaur, RSangal, GP Bagaria,2009, AFoundationCourse in Huma Values and Professional Ethics, Excel Books Private Limited, New Delhi.
2. Teacher's manual: RR Gaur. R Sangal, GP Bagaria. 2009, Teacher's Manual: A Foundation Course in Human Values and Professional Ethics. Excel Books Private Limited. New Delhi.

Reference Books

1. IvanIllich,1974, Energy & Equity. The Tinity Press, Worcester, and Harper Collins, USA.
2. Sussan George, 1976, How the Other Half Dies, Penguin Press.Reprinted 1986,1991
3. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. BchrensIII.197LimitstoGrowth-Club of Rome's report. Universe Books.
4. A Nagraj,1998, Jeevan Vidyaek Parichay, Divya Path Sansthan, Amarkantak.
5. PL Dhar ,RR Gaur,1990, Science and Humanism,Common wealth Purblishers.

Relevant websites, CDs, Movies and Documentaries

ValueEducationwebsite,http://www.uptu.ac.in
StoryofStuff,http://www.storyofsiuf.com
AlGore, AnInconvenient Truth. Paramount Classics, USA
Charlie Chaplin, Modern Times.United Artists, USA
IITDelhi.ModernTechnology-theUntoldStory
AnandGandhi,Right here right now.Cyclewalaproduction

BPA-706P PHARMACEUTICAL MICROBIOLOGY

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

List of experiments:

1. To carry out working and Principle of Compund and Binocular microscope.
2. To study micrometry (drawscales)
3. To study working and Principle of Autoclave, hot air oven, laminar air flow, incubator etc
4. To prepare various types of culture media.
5. To study various sub-culturing of common aerobic and anaerobic bacteria, fungusandyeast
6. To study various isolation and identification of bacteria, fungus.
7. To carry out different sterilizing techniques
8. To prepare cotton plugs for sterilization.

TextBooks:

1. Hugo and Russel.Pharmaceutical Microbiology.Oxford: Balckwell.
2. Pelczar PC. Microbiology. New Delhi: Tata McGraw Hill.

Reference Books:

1. Ananthanarayan A, Panickar J. Textbook of Microbiology. Hyderabad: Orient Longman.
2. Prescott LM, Harley GP, Klein DA. Microbiology. Oxford: VCBrown Publishers.
3. Indian Pharmacopoeia. New Delhi: Controller of Publications.

BPA-707P RAS SHASTRA-III

Note:

Practicals as per topics in the syllabus for the course will be conducted in the laboratory class. Following is suggested a list of exercises out of which a minimum of 10/12 experiments must beperformed by a student during the semester.

List of experiments:

1. To study the indentification Maharas varga dravyas.
2. To study the Shodhana process of Makshik.
3. To study the Shodhana process of Shilajatu.
4. To study the Shodhana process of Sasyaka.
5. To study the indentification of Uprasa varga dravyas.
6. To study the Shodhana process of Gandhaka.
7. To study the Shodhana process of Gairika.
8. To study the Shodhana process of Kasisa.
9. To study the Shodhana process of Kankshi
10. To study the indentification of sadharana rasa varga dravyas.
11. To study the Shodhana process Kapardika.
12. To study the Shodhana process of Hingula.
13. To study the indentification and Shodhana process of Dhatu varga.
14. To prepare the Bhasma of Kapardika.

Text Books:

1. Text book of Rasa Shastra by Dr.K. Ramachandra Reddy, Chaukhamba Sanskrit Bhawan,Varanasi.
2. Text Book of Rasa Shastra by Dr. Siddhin and Mishra, Chaukhamba Sanskrit Bhawan,Varanasi.
3. Text book Nutan Ayurvediya Rasa Shastra by Dr. Santosh Kumar Mishra, ChakhambhaOrientalia, Varanasi.
4. Ayurvediya Rasa Shashtra by Dr. Chandrabhushan Jha, Chaukhamba, Varanasi.

Reference Books:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I&II Govt.of India Publication.
3. The Ayurvedic Pharmacopoeia of IndiaPart-II, Govt. of India Publication.
4. Ayurved SaraSangraha. RasaTantra Saraavum Siddha Prayog Sangraha, Sri Krishan GopalBhawan Kaleda, Rajasthan.
5. Rasa Ratna Samuchaya by Vagbhatt, Chaukhamba, Varanasi.

BPA-708T Elective@

@Students have to choose one of the elective subject as per their interest

Biostatistics and Research Methodology (BPA-708A)

Unit-I

Introduction: Statistics, Biostatistics, Frequency distribution

Measures of central tendency: Mean, Median, Mode- Pharmaceutical examples **Measures of dispersion**: Dispersion, Range, standard deviation, Pharmaceutical problems

Correlation: Definition, Karl Pearson's coefficient of correlation, Multiple correlation - Pharmaceuticals examples

Unit-II

Regression: Curve fitting by the method of least squares, fitting the lines y= a + bx and x = a + by, Multiple regression, standard error of regression– Pharmaceutical Examples **Probability:**Definition of probability, Binomial distribution, Normal distribution, Poisson's distribution, properties - problems

Sample, Population, large sample, small sample, Null hypothesis, alternative hypothesis,sampling, essence of sampling, types of sampling, Error-I type, Error-II type, Standard error of mean (SEM) - Pharmaceutical examples

Parametric test: t-test(Sample, Pooled or Unpaired and Paired) , ANOVA, (One wayand Two way), Least Significance difference

Unit-III

Non Parametric tests: Wilcoxon Rank Sum Test, Mann-Whitney U test, Kruskal-Wallistest,Friedman Test

Introduction to Research: Need for research, Need for design of Experiments,Experiential Design Technique, plagiarism

Graphs: Histogram, Pie Chart, Cubic Graph, response surface plot, Counter Plot graph **Designing the methodology:** Sample size determination and Power of a study, Report writing and presentation of data, Protocol, Cohorts studies, Observational studies, Experimental studies, Designing clinical trial, various phases.

Unit-IV

Blocking and confounding system for Two-level factorials

Regression modeling: Hypothesis testing in Simple and Multiple regressionmodels **Introduction to Practical components of Industrial and Clinical Trials Problems**: Statistical Analysis Using Excel, SPSS, MINITAB®, DESIGN OF EXPERIMENTS, R - Online Statistical Software's to Industrial and Clinical trial approach

Unit-V

Design and Analysis of experiments:

Factorial Design: Definition, 2^2, 2^3design. Advantage of factorial design **Response Surface methodology**: Central composite design, Historical design, Optimization Techniques

Recommended Books (Latest edition):

1. Pharmaceutical statistics- Practical and clinical applications, Sanford Bolton,publisher Marcel Dekker Inc. NewYork.
2. Fundamental of Statistics – Himalaya Publishing House- S.C.Guptha
3. Design and Analysis of Experiments –PHI Learning Private Limited, R.Pannerselvam,
4. Design and Analysis of Experiments –Wiley Students Edition,Douglas and C. Montgomery

Pharmaceutical Regulatory Science (BPA-708B)

Unit I

New Drug Discovery and development

Stages of drug discovery, Drug development process, pre-clinical studies, non-clinical activities, clinical studies, Innovator and generics, Concept of generics, Generic drug product development.

Unit II

Regulatory Approval Process

Approval processes and timelines involved in Investigational New Drug (IND), New Drug Application (NDA), Abbreviated New Drug Application (ANDA). Drug approval process of Ayurvedic formulations.

Regulatory authorities and agencies

Overview of regulatory authorities of India for Ayurvedic medicines.

Unit III

Registration of Indian drug product in overseas market

Procedure for export of pharmaceutical products, Technical documentation, Drug Master Files (DMF), Common Technical Document (CTD), electronic Common Technical Document (eCTD), ASEAN Common Technical Document (ACTD)research.

Unit IV Clinical trials

Clinical trial protocol of Ayurvedic drugs/formulations, Institutional Review Board / Independent Ethics committee - formation and working procedures, Informed consent process and procedures, GCP obligations of Investigators, sponsors & Monitors, Managing and Monitoring clinical trials, Pharmacovigilance - safety monitoring in clinical trials

Unit V

Regulatory Concepts

Regulatory requirements for Ayurvedic products

Recommended books (Latest edition):

1. Drug Regulatory Affairs by Sachin Itkar, Dr. N.S. Vyawahare, Nirali Prakashan.
2. The Pharmaceutical Regulatory Process, Second Edition Edited by Ira R. Berry and Robert P.Martin, Drugs and the Pharmaceutical Sciences,Vol.185. Informa Health care Publishers.
3. New Drug Approval Process: Accelerating Global Registrations By Richard AGuarino,MD, 5th edition, Drugs and the Pharmaceutical Sciences,Vol.190.
4. Guidebook for drug regulatory submissions / Sandy Weinberg. By John Wiley &Sons. Inc.
5. FDA Regulatory Affairs: a guide for prescription drugs, medical devices, andbiologics /edited by Douglas J. Pisano, David Mantus.
6. Generic Drug Product Development, Solid Oral Dosage forms, Leon Shargel and IsaderKaufer, Marcel Dekker series, Vol.143
7. Clinical Trials and Human Research: A Practical Guide to Regulatory ComplianceBy Fay A.Rozovsky and Rodney K. Adams

8. Principles and Practices of Clinical Research, Second Edition Edited by John I. Gallin andFrederick P. Ognibene
9. General Guidelines For Drug Development Of Ayurvedic Formulations, CCRAS, Ministry of AYUSH,Govt. of India.

Pharmacovigilance (BPA-708C)

Unit I

Introduction to Pharmacovigilance

History and development of Pharmacovigilance.

Importance of safety monitoring of Medicine

WHO international drug monitoring programme

Pharmacovigilance Program of India(PvPI)

Introduction to adverse drug reactions

Definitions and classification of ADRs. Detection and reporting

Methods in Causality assessment. Severity and seriousness assessment. Predictability and preventability assessment.

Management of adverse drug reactions

Ayurvedic Concepts of Adverse Reactions. Detection of adverse reactions to ayurvedic medicines

Basic terminologies used in pharmacovigilance

Terminologies of adverse medication related events

Regulatory terminologies

Unit II

Drug and disease classification

Anatomical, therapeutic and chemical classification of drugs

International classification of diseases.

Daily defined doses

International Non proprietary Names for drugs

Drug dictionaries and coding in pharmacovigilance

WHO adverse reaction terminologies

MedDRA and Standardised MedDRA queries

WHO drug dictionary

Eudravigilance medicinal product dictionary

Information resources in pharmacovigilance

Basic drug information resources

Specialised resources for ADRs

Establishing pharmacovigilance programme

Establishing in a hospital

Establishment & operation of drug safety department in industry

Contract Research Organisations (CROs)

Establishing a national programme

Unit III

Vaccine safety surveillance
Vaccine Pharmacovigilance
Vaccination failure
Adverse events following immunization

Pharmacovigilance methods
Passive surveillance – Spontaneous reports and case series
Stimulated reporting
Active surveillance – Sentinel sites, drug event monitoring and registries
Comparative observational studies – Cross sectional study, case control study andcohort study
Targeted clinical investigations

Communication in pharmacovigilance
Effective communication in Pharmacovigilance
Communication in Drug Safety Crisis management
Communicating with Regulatory Agencies, Business Partners, Healthcare facilities & Media

Safety data generation
Pre clinical phase
Clinical phase
Post approval phase (PMS)

ICH Guidelines for Pharmacovigilance
Organization and objectives of ICH
Expedited reporting
Individual case safety reports
Periodic safety update reports
Post approval expedited reporting
Pharmacovigilance planning
Good clinical practice in pharmacovigilance studies

Unit V
Pharmacogenomics/ Ayurgenomics of adverse drug reactions

Genetics related ADR with example focusing PK parameters.

Drug safety evaluation in special population. Paediatrics, Pregnancy and lactation, Geriatrics

CIOMS. CIOMS Working Groups, CIOMS Form

CDSCO (India) and Pharmacovigilance

D&C Act and Schedule Y

Differences in Indian and global pharmacovigilance requirements

Recommended Books (Latest edition):

1. Textbook of Pharmacovigilance: S K Gupta, Jaypee Brothers, Medical Publishers.
2. Practical Drug Safety from A to Z By Barton Cobert, Pierre Biron, Jones and Bartlett Publishers.
3. Mann's Pharmacovigilance:Elizabeth B. Andrews, Nicholas, Wiley Publishers.
4. Stephens' Detection of New Adverse Drug Reactions: John Talbot, Patrick Walle, Wiley Publishers.
5. An Introduction to Pharmacovigilance: Patrick Waller,Wiley Publishers.
6. Cobert's Manual of Drug Safety and Pharmacovigilance: Barton Cobert,Jones& Bartlett Publishers.
7. Textbook of Pharmacoepidemiolog edited by Brian L. Strom, Stephen E Kimmel, SeanHennessy,Wiley Publishers.
8. A Textbook of Clinical Pharmacy Practice -Essential Concepts and Skills:G. Parthasarathi, Karin NyfortHansen,Milap C. Nahata
9. National Formulary of India
10. Text Book of Medicine by Yashpal Munjal

Hospital Training **

**Hospital training (Desirable): Every candidate shall be required to work for at least 15 days in an Ayurvedic/ Allopathic Hospital. It includes various units of hospital including OPD, Mionr OT, Pharmacy etc. In the end of the Semester – VIII student shall submit satisfactory report of such work and certificate duly signed by the authority of training organization to the head of the institute.

SEMESTER-VIII

BPA-801T MODERN ANALYTICAL TECHNIQUES

Unit-I

a) Nuclear Magnetic Resonance Spectroscopy:

An introduction to the theory of NMR, magnetic properties of the nuclear magnetic moments, absorption of energy, chemical shift, shielding and deshielding, spin-spincoupling, NMR instrumentation, analytical applicationin pharmaceutical analysis.

b) Mass Spectrometry:

Instrumentation, Basic principle determination of the molecular formula, recognition of the molecular ion peak, fragmentation, mass spectra of simple compounds (saturated hydrocarbons).

Unit-II

a) Atomic Absorption Spectroscopy:

Theory of absorption of radiant energy by atoms, equipment, analytical applications.

b) Principle of Turbidimetry and Nephlometry with their Instrumentation and Apllications.

Unit-III

a) Affinity Chromatography

1. Supercritical fluid Chromatography, Techniques by separation Mechanism
2. Ion exchange Chromatography
3. Size exclusion Chromatography
4.EBA Chromatographic separation.

b) Special Chromatography

Special Techniques-1. Reversed phase Chromatography 2.Two dimensional Chromatography 3.Simulated moving bed Chromatography 4. Pyrolysis gas Chromatography 5. Fast protein Liquid Chromatography 6. Counter current Chromatography7.Chiral Chromatography.

Unit-IV

a) X-Ray

The theoretical aspects, instrumentation, interpretation of spectra and applications of X-ray diffraction in Pharmacy.

b) Radio Immuno Assay(RIA)

The theoretical aspects, instrumentation and diagnostic, medical and pharmaceutical applications of RIA

Text Books:

Lee, DC. Pharmaceutical Analysis. London: Blackwell.
Munson JW. Pharmaceutical Analysis: Modern Methods. PartA &B. NewYork:MarcelDekker

ReferenceBooks:

Willard HH, Merritt LL, Dean JA. Instrumental Methods of Analysis.NewDelhi: CBSPublishers.
Ewing GW. Instrumental Methods of Chemical Analysis.Singapore: McGrawHill.
3. Schirmer RE. Modern Methods of Pharmaceutical Analysis. Vol1&2. Pennsylvania: FranklinBook Co.
KempW.OrganicSepctroscopy:London:ELBS/WHFreeman&Co.

BPA-802T RASA SHASTRA-IV

Unit-I

a) Ratna

Identification, synonyms, occurence, properties, grahya-agrahya lakshna, samanya-vishesh shodhana, marana, dose, therapeutic uses and phamacopoieal standards of bhasma of following ratna: Manikya, Mukta, Pravala, Tarksya, Pusaparaga, Vajra, Nilam, Gomeda, Vaidurya.

b) Uparatna

Identification, synonyms, occurrence, properties, grahya-agrahya lakshna, samanya-vishesh shodhana, marana, dose, therapeutic uses andphamacopoieal standards of bhasma of following upratna: Suryakanta, Candrakanta, Rajavarta, Pairojaka, Sphatikamani, Trnakanta, Palanaka, Puttika, Rudhira.

Unit-II

a) Sudha varga

Identification, synonyms, occurrence, properties, grahya-agrahya lakshna, samanya-vishesh shodhana, marana, dose, therapeuticuses and phamacopoieal standards of bhasma of following drugs of sudhavarga: Sudha, Sukti, Sankha, Badarasma, Mrigasrnga, Khatika, Godanti, Samudraphena, Kukkutandtwak.

b) Sikta varga

Identification, synonyms, occurrence, properties, grahya-agrahya lakshna, samanya-vishesh shodhana, marana, dose, therapeuticusesandphamacopoiealstandardsofbhasmaoffollowing drugs of sikta varga: Sikta, Dugdhapasana, Nagapasana, Vyomasma, Sange Yeshab, Kouseyasma, Akika.

Unit-III

a) Ksara Varga

Identification, synonyms, occurrence, properties, grahya-agrahya lakshna, samanya-vishesh shodhana, marana, dose, therapeutic uses and phamacopoieal standards of following ksara: Sarjaksara, Yavaksara, Tankana Ksara, Surya Ksara.

b) Vishaand Upavisha

Introduction, collection and storage, classification, synonyms, knowledge of its impurities, Shodhana, vishakta lakshana (if any), antidote, therapeutic and toxic doses, therapeutic uses and formulations of following visha and upavisha: Vatsanabha, kuchala, jayapala, Dhatturabija, Bhang, Bhallataka, Gunja, Arka, Snuhi, langali, Karavira, Ahiphena, Chitrakamula.

Unit-IV

a) Brief Knowledge of standardization of Ras ausadhis.

b) Concept of Pharmacovigilance and its status in India with reference to Ayurvedic drugs.

Schedule E-1 drugs (List).

TextBooks:

1. Text book of Rasa Shastra by Dr.K. Ramachandra Reddy, Chaukhamba Sanskrit Bhawan,Varanasi
2. Text Book of Rasa Shastra by Dr. Siddhinandana Mishra, Chaukhamba Sanskrit Bhawan,Varanasi
3. Text book Nutan Ayurvediya Rasa Shastra by Dr. Santosh Kumar Mishra, ChakhambhaOrientalia, Varanasi
4. Ayurvediya Rasa Shashtra by Dr. Chandrabhushan Jha, Chaukhamba, Varanasi

ReferenceBooks:

1. TheDrugs&CosmeticsAct1940.
2. The Ayurvedic Formulary of India, Part-I & II Govt.of India Publication.
3. The Ayurvedic Pharmacopoeia of India Part-II, Govt. of India Publication.
4. Ayurved Sara Sangraha.
5. RasaTantra Saraavum Siddha Prayog Sangraha, Sri Krishan Gopal Bhawan Kaleda, Rajasthan.

BPA-803T CLINICAL PHARMACY

Unit-I Clinical Pharmacokinetics

a) Clinical laboratory tests for Liver function and Kidney function. Drug Interactions Factors- Drug determinants, Host determinants, Multiple drug therapy, Methods of investigating drug interactions, Clinical investigation of specific drug interactions, Pharmacokinetic aspects of drug Interaction-Drug elimination, distribution and absorption

Prevention of drug interactions in general practice.

b) Drugs used in pregnancy, pediatrics and geriatrics. Management of cardiovascular disorders, CNS disorders, Gastro-intestinal diseases and respiratory diseases.

Unit-II

Drug information services, documentation and counseling of patients

Ambulatory patientcare: Pharmacist's responsibility, proper use of medication, patient counselling, drug utilization review, medication profiles, non-prescription drug usage, health education, new and expanded dimensions, health caredelivery systems.

Patient compliance-Non compliance, factors associated with noncompliance, improving compliance.

Unit-III

Procurement and distribution of drugs in an Institution (Hospital Pharmacy)

Hospital - Definition of hospital pharmacy, organization, and facilities provided- pharmacist's responsibility - technical responsibilities (procurement, storage, dispensing, control, stock and inventory control, manufacturing sterile products, investigational drugs, I.V. admixtures, radiopharmaceuticals, assay and quality control), administrative and academic responsibilities.

Unit-IV

Intravenous admixtures, Intravenous fluids packaging systems, administrative sets, administration procedures including volume control method, piggy back method, patient controlled analgesia, final filter devices, intravenous admixtures—additives, parenteral incompatibility, total parenteral nutrition.

TextBooks:

1. M. Rowlandand T.N. Tozer, Clinical Pharmacokinetics: Conceptsand Applications, Lea andFebiger,Philadelphia, 2nd edition ,3989.
2. N. Thakur Lecture on Clinical Pharmacy ,P. Prakashan,India

ReferenceBooks:

1. Remington, The Science and Practice of Pharmacy,19th edition, 1995, Mack Publishing Co., U.S.A.
2. E.V. Klejin and J.R. Jonders, Clinical Pharmacy, Elsevier/North Holl and Biomedical Press, NY 1977.
3. E.T. Herfindal, D.R. Gourley and L.L. Hart, Clinical Pharmacy and Therapeutics, Williams's and Wilkins, 4th edition, London, 1988.

BPA-804T YOGA

Unit-I Astangayoga:

Yama, Niyama Asana and its importance Standing Postures Ardhakatichakrasana, Padahastasana, Ardhachakrasana, Trikonasana. Sitting postures Swasthika, Gomukhasana, Padmasana, Vajrasana, Bhadrasana, Shashankasana, Ushtrasana, Pashchimottanasana, Suptavajrasana, ardhamatsyendrasana, Siddhasana. Supine Postures Pavana muktasana, Sarvangasana, Matsyasana, Halasana, Chakrasana, Shavasana, Setubandhasana. Prone postures Bhujangasana, Shalbhasana, Dhanurasana, Makarasana.

Unit-II

Suryanamaskara–procedure and benefits.

Unit-III Pranayam:

Benefits of pranayama, time of practice, avara-pravara-madhyama lakshana, yukta-ayukta lakshanaNadishudhi Pranayama.

Unit-IV

Kumbhakabheda–suryabhedana, ujjayi, sheetali, Sitkari, Bhastrika, Bhramari, Nadishudhilakshana

TextBooks:

1. Yoga avum Pranayam Cikitsaya Rahasaya by Dr. Anuplata Singla.
2. Pranayam. The Modulator of life by Dr. Sarvesh Kumar Aggarwal.

ReferenceBooks:

1. Yog Chikitsa avum Udhar Rog Nivarana by Acharaya Vishvnath Devadi.
2. Hath Yog Pradipika by Dr. Sarvesh Kumar Aggarwal.
3. Yoga and Naturopathy by Dr. Chanderbhan Sharma.

BPA-805T HERBAL COSMETICS

Unit-I

Introduction and importance of cosmetics as per description in Ayurvedic texts. Study of different medicinal plants described for use as cosmetics such as chandan, padmak, manjistha, sariva, mulathi, nagkesar etc.as mentioned under varnya mahakashaya.

Unit-II

Description of different classical formulations described for various cosmetic purposes suchasubtans, lepa, oils, creams etc.

Unit-III

Study of various preparations used as mouth fresheners, face packs, hair oils, creams, lotions,pastes.

Unit-IV

Study and evaluation parameters of modern technology in preparation of cosmetics such asCream, Shampoo and Gel.

Unit-V

Introduction of AFI and its importance.
Study of different dosage forms described in AFI. Doses of different dosage forms described under AFI.
Shelf life of different Ayurvedic dosage forms asper API/AFI.

TextBooks:

1. Relevant portions of Charaka, Sushruta, Vagbhata, Sarngadhara, Bhavaprakasha, Yogaratnakara, Madhavanidana and Bhelasamhita
2. AFI Part.I & II and and API (all Volumes)
3. Relevant parts of basic texts Chakradutt, Bhaishjaya Ratnawali etc.

ReferenceBooks:

1. Data base on medicinal plants CCRAS.

BPA-806T MARKETING MANAGEMENT

Unit I

Marketing:
Definition, general concepts and scope of marketing; Distinction between marketing & selling; Marketing environment; Industry and competitive analysis; Analyzing consumer buying behavior; industrial buying behavior.

Pharmaceutical market:
Quantitative and qualitative aspects; size and composition of the market; demographic descriptions and socio-psychological characteristics of the consumer; market segmentation& targeting.Consumer profile; Motivation and prescribing habits of the physician; patients' choice of physician and retail pharmacist. Analyzing the Market;Role of market research.

Unit II

Product decision:
Classification, product line and product mix decisions, product life cycle, product portfolio analysis; product positioning; New product decisions; Product branding, packaging and labeling decisions, Product management in pharmaceutical industry.

Unit III

Promotion:
Methods, determinants of promotional mix, promotional budget; An overview of personal selling, advertising, direct mail, journals, sampling, retailing, medical exhibition, public relations, online promotional techniques for OTC products

Unit IV

Pharmaceutical marketing channels:
Designing channel, channel members, selecting the appropriate channel, conflict in channels, physical distribution management: Strategic importance, tasks in physical distribution management.

Professional sales representative (PSR):
Duties of PSR, purpose of detailing, selection and training, supervising, norms for customer calls, motivating, evaluating, compensation and future prospects of the PSR.

Unit V

Pricing:
Meaning, importance, objectives, determinants of price; pricing methods and strategies, issues in price management in pharmaceutical industry. An overview of AYUSH, CDSCO, DPCO (Drug Price Control Order) and NPPA (National Pharmaceutical Pricing Authority).

Emerging concepts in marketing:
Vertical & Horizontal Marketing; Rural Marketing; Consumerism; Industrial Marketing; Global Marketing.

Recommended Books: (Latest Editions)

1. Philip Kotler and Kevin Lane Keller: Marketing Management, Prentice Hall of India, New Delhi
2. Walker, Boyd and Larreche : Marketing Strategy- Planning and Implementation, Tata MCGrawHill, New Delhi.
3. Dhruv Grewal and Michael Levy: Marketing, Tata MC Graw Hill
4. Arun Kumar and N Menakshi: Marketing Management, Vikas Publishing, India

5. Rajan Saxena: Marketing Management; Tata MC Graw-Hill (India Edition)
6. Ramaswamy, U.S & Nanakamari, S: Marketing Managemnt:Global Perspective, IndianContext,Macmilan India, New Delhi.
7. Shanker, Ravi: Service Marketing, Excell Books, New Delhi
8. Subba Rao Changanti, Pharmaceutical Marketing in India (GIFT – Excel series) ExcelPublications.

BPA-807P MODERN ANALYTICAL TECHNIQUES

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

List of experiments

1. Identification of Amino acids by Ascending Paper Chromatography.
2. Separation of Amino acids by Ascending Paper Chromatography.
3. Identification of sugars by Thin Layer Chromatography.
4. Separation of sugars by Thin Layer Chromatography.
5. Separation of active principle of Drug by Thin Layer Chromatography.
6. Identification of active principle by comparing with standard Drug.
7. Moisture Analysis in powder drugs.
8. Measurement of Optical activity in different drugs.
9. Measurement of Refractive Index.
10. Determination of pH of various Extract.

TextBooks:

1. L.G. Chatten, Pharmaceutical Chemistry, Vol.-1and2, Marcel Dekker, NY(Latest Edition).
2. A.H. Beckettand J.B. Stenlake, Practical Pharmaceutical Chemistry, Vol.1and2,Athlone Press of the University of London (Latest Edition).

ReferenceBooks:

1. H. Willard, L.L., Marriott; Jr., J.A. Dean, Instrumental Method of Analysis, Van Nostrand Reinhold, N.Y.
2. J.W. Robinson, Undergraduate Instrumental Analysis, Marcel and Dekker Inc., NY,1970 (Latest Edition).
3. V.M. Parikh, Absorption Spectroscopy of Organic Molecules, Addison – WesleyPublishing Co., London,1974.

BPA-808P RASA SHASTRA-IV

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

List of experiments:

1. To study the *Shodhana* process of *Mukta*.
2. Tostudythe Shodhana process of *Pravala*.
3. To prepare the *pisti* of *Pravala*.
4. To study the *Shodhana* process of *Shankha*.
5. To prepare the *Bhasma* of *Shankha*.
6. To study the *Shodhana* process of *Mrigshringa*.
7. To prepare the *Bhasma* of *Mrigshringa*.
8. To study the *Shodhana* process of *Kuchala*.
9. To study the *Shodhana* process of *Bhallataka*.
10. To prepare *Yava kshara*.
11. To prepare *Apamarga Kshara*.

TextBooks:

1. Text book of Rasa Shastra by Dr. K. Ramachandra Reddy, ChaukhambaSanskrit Bhawan, Varanasi
2. Text book of Rasa Shastra by Dr. Siddhinandana Mishra, Chaukhamba SanskritBhawan, Varanasi
3. Text book Nutan Ayurvediya Rasa Shastra by Dr. Santosh Kumar Mishra,Chakhambha Orientalia, Varanasi
4. Ayurvediya Rasa Shashtra by Dr. Chandrabhushan Jha, Chaukhamba, Varanasi

ReferenceBooks:

1. The Drugs & Cosmetics Act 1940.
2. The Ayurvedic Formulary of India, Part-I&II Govt. of India Publication.
3. The AyurvedicPharmacopoeia of India Part-II, Govt. of India Publication.
4. Ayurved Sara Sangraha.
5. Rasa Tantra Saraavum Siddha Prayog Sangraha, SriKrishan Gopal Bhawan Kaleda,Rajasthan.
6. Rasa Ratna Samuchaya by Vagbhattn Chaukhamba, Varanasi

BPA-809P YOGA

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratoryclass. Practical demonstration of some of the mentioned Asana, Pranayamas.

TextBooks:

1. Yogavum Pranayam Cikitsaya Rahasaya by Dr. Anuplata Singla.
2. Pranayam.The Modulator of life by Dr. Sarvesh Kumar Aggarwal.

ReferenceBooks:

1. Yog Chikitkaavum Udhar Rog Nivarana by Acharaya Vishvnath Devadi.
2. Hath Yog Pradipika by Dr. Sarvesh Kumar Aggarwal.
3. Yoga and Naturopathy by Dr. Chanderbhan Sharma.

BPA-810P HERBAL COSMETICS

Note:
Practicals as per topics in the syllabus for the course will be conducted in the laboratory class.

1. To prepare ubtans (facepack)
2. To prepare herbal cream.
3. To prepare herbal toothpaste.
4. To prepare hairoil.
5. To prepare herbal shampoo.
6. To prepare herbal soap.
7. To prepare mouth fresheners.
8. To prepare hand sanitizer.
9. To prepare herbal loation.
10. To prepare herbal gel.

Text Books:

1. Relevant portions of Charaka, Sushruta, Vagbhata, Sarngadhara Samhita,Bhavaprakasha,Yogaratnakara.

ReferenceBooks:

1. Database on medicinal plants CCRAS.

PROJECT WORK

All the students shall undertake a project under the supervision of a teacher and submit a report. The project shall be carried out individualy or in group not exceeding 4 in number. The project report shall be submitted in triplicate (typed & bound copy not less than 25 pages). The internal and external examiner appointed by the University shall evaluate the project at the time of the Practical examinations of other semester(s). The projects shall be evaluated as per the criteria given below.

Evaluation of Dissertation Book:

Objective(s) of the work done: 10 Marks

Methodology adopted: 15 Marks

Results and Discussions: 15 Marks

Conclusions and Outcomes: 10 Marks

Total: 50 Marks

Evaluation of Presentation:

Presentation of work: 15 Marks

Communication skills: 15 Marks

Question andanswer skills: 20 Marks

Total: 50 Marks