



**BHARATI VIDYAPEETH
DEEMED TO BE UNIVERSITY
PUNE**

**FACULTY OF AYURVED
MD- Rasashashtra Evam
Bhaishjya Kalpana
New Syllabus**



BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY) PUNE, INDIA.

FACULTY OF AYURVED

Pune- Satara Road, Pune-411043.

Rasashashtra Evam Bhaishjya Kalpana

Accredited with 'A+' Grade (2017) by NAAC.

'A' Grade University status by MHRD, Govt. of India

Accredited (2004) & Reaccredited (2011) with 'A' Grade by NAAC.

Post- Graduate (M.D./M.S./Diploma in Ayurved)

Syllabus/ Curriculum

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Preface

Ayurveda is accepted worldwide as one of the oldest traditional systems of medicine. The ancient insight in this traditional system of medicine is still not profoundly discovered. Ayurveda signifies as "the life-science " where ayur means "life" and veda means "science" in Sanskrit. Ayurveda is the upaveda i.e. "auxiliary knowledge of Atharvaveda in Vedic tradition with its prime origin from Atharva-Veda and a supplement of the Rig-Veda. Lord Dhanvantari is worshipped as the God of Ayurveda. The goal of this traditional medicine system is to prevent illness, disease cure and preserve life. Being originated in India Ayurveda extends its wings in various parts of the world. In ancient days Ayurveda was taught in Gurukula system, which is now evolved in to post graduate courses from Institutions.

The Indian Medical Council was set up in 1971 by the Indian government to establish maintenance of standards for undergraduate and postgraduate education. It establishes suitable qualifications in Indian medicine and recognizes various forms of traditional practice including Ayurveda.

Ayurvedic practitioners also work in rural areas, providing health care to the million people in India alone. They therefore represent a major force for primary health care, and their training and placement are important to the government of India. Being a scientific medicine, Ayurveda has both preventive and curative aspects. The preventive component emphasizes the need for a strict code of personal and social hygiene, the details of which depend upon individual, climatic, and environmental needs.

The Bachelor of Ayurvedic Medicine and Surgery, MD/MS in various discipline of

Ayurveda started with the intention to encourage integrated teaching and de-emphasize compartmentalization of disciplines so as to achieve horizontal and vertical integration in different phases which helps to support National Health Services.

Looking into the health services provided to the public, understanding the need of practitioners of Ayurvedic system of medicine, as per the guidelines of apex body National Council of Indian system of Medicine (formerly CCIM) and suggestions provided by the faculty of various Specialties, stake holders and strategy of University this governance is framed

based on following aims and objectives -

Aims and objectives-

The aims of the post-graduate degree courses shall be to provide orientation of specialties and super-specialties of Ayurveda, and to produce experts and specialists who can be competent and efficient teachers, physicians, surgeons, gynaecologists and obstetricians (Stri Roga and Prasuti Tantragraha), pharmaceutical experts, researchers and profound scholars in various fields of specialization of Ayurveda.

Faculty of Ayurved, Bharati Vidyapeeth (Deemed to be University), Pune

Vision-

To be a world class university for social transformation through dynamic education

Mission-

- To ensure the good health and longevity of mankind.
- To carve a niche for our college in the world of Ayurved education
- To provide
 - Borderless access to Ayurved education
 - Quality Ayurved education
- To promote
 - Quality research in diverse areas of health care system.
 - Extensive use of ICT for teaching, learning and governance.
 - To develop national and international networks with industry and other academic and research institutions.

Program Outcomes For Post Graduate Courses in Ayurved-

- PG degree holder should be expert and specialist of his/ her branch who can be competent and efficient teacher, physician, surgeon, gynaecologist and obstetrician (Stri Roga and Prasuti Tantragrahya), pharmaceutical expert, researcher and profound scholar in various fields of specialization of Ayurved.
- Should be having knowledge of Concept of Good clinical practices in Ayurved and modern medicine

Course specific outcomes

M. S – Ayurved Dhanvantari in

1. PRASUTI TANTRA & STREEROGA [OBSTETRICS AND GYNECOLOGY]

- To be able to manage normal and complicated Pre-natal, Intra partum and Post natal cases by integrative approach
- To be able to manage all types of gynecological disorders at every epoch of womanhood.
- To be able to perform all kinds of Ayurvedic procedures and surgical procedures related to Stree roga and Prasutitantra
- To have knowledge of medico legal aspects of obstetrics and gynecology.

M. S – Ayurved Dhanvantari in

2. SHALAKYA TANTRA [NETRA, SHIRO, NASA, KARNA, KANTHA, MUKHA]

- To be able to manage all cases of E.N.T. and ophthalmology by integrative approach.
- To be able to perform all kinds of Ayurvedic procedures and surgical procedures related to Shalakyatantra
- To have knowledge of medico legal aspects of Shalakyatantra

M. S – Ayurved Dhanvantari in

3. SHALYA TANTRA [GENERAL SURGERY]

- To be able to manage all surgical cases by integrative approach
- To be able to perform all kinds of Ayurvedic procedures and general surgical procedures
- To have adequate knowledge of Anushashtra – Ksharkarma and prayoga, Agnikarma [thermo therapy], Raktamokshan [bloodletting] or Asthisandhi evam marma vigyan [orthopedic] or Sangyahan [Anesthesiology] or Mootraroga [Urology]
- To have knowledge of medico legal aspects of Shalyatantra

M.D.- Ayurved Vachaspati in

1. AYURVED SAMHITA & SIDDHANT

- to have profound knowledge of Charak Samhita, Sushrut Samhita & AshtangHridayam, Ayurvediya and Darshanika Siddhanta with commentaries
- to be able to interpret philosophical principles incorporated in Charak Samhita, Sushrut Samhita, Ashtanga Hridaya, Ashtang Samgraha.
- To able to understand Practical applicability of principles of samhita and a competent Ayurved physician
- Competency in fundamental research

M.D.- Ayurved Vachaspati in

2. RACHANA SHAARIRA

- Should have thorough knowledge and competency in Ayurved Sharira and Modern anatomy
- Having extensive knowledge and skill of dissecting human dead bodies and its demonstration.

M.D.- Ayurved Vachaspati in

3. KRIYA SHARIR

- Having profound knowledge of Ayurved Kriya Sharir: - - and Contribution of different Ayurveda Samhita in Kriya Sharir
- Ability to determine and demonstrate the Sharir – Manans Prakriti
- Should have knowledge of Modern Physiology and its applied aspects

M.D.- Ayurved Vachaspati in

4. DRAVYAGUNA VIGYAN

- Have a clear understanding of medicinal plants in context to Ayurved and modern Pharmacology and Pharmaceutics
- Have an accurate knowledge of identification, Authentication and standardization of raw and wet plant drugs.
- Ability of cultivation and plantation of medicinal plants
- Knowledge about Pharmacovigilance
- Ability to conduct the pre clinical and clinical trials of medicinal plants

M.D.- Ayurved Vachaspati in

5. RASASHASTRA EVAM BHAISHJYA KALPNA

- Have an accurate knowledge of identification, Authentication and standardization of minerals and metals along with plant drugs
- Possess detailed knowledge of manufacturing practices of various dosage forms of

Ayurved formulations as per GMP

- Ability to establish, run and manage pharmacy as per GMP and FDA guidelines
- Having knowledge of Drug and cosmetics related acts
- Ability to conduct the pre clinical and clinical trials on minerals and metals

M.D.- Ayurved Vachaspati in

6. AGADA TANTRA EVUM VIDHIVAIDYAKA

- To be able to understand and interpret Ayurvedic and Contemporary Toxicology
- Having knowledge of Pharmacodynamics of different formulations used in Agadatantra and Clinical & Experimental toxicology
- Ability of Ayurvedic & Contemporary Management Of Poisoning
- Should have profound knowledge of Forensic Medicine and Medical Jurisprudence
- Ability to diagnose and manage substance abuse [De- addiction]
- Have knowledge of Pharmacovigilance, community health problems due to poisons & pollution, Drug interactions & incompatibility etc.

M.D.- Ayurved Vachaspati in

7. SWASTHAVRITTA

- Having knowledge of Concept of holistic health and Principles of dietetics according to Ayurveda
- Understanding the Concept of community health, prevention, Stages of intervention according to Ayurved Modern medicine
- Should have knowledge of Ayurved and Modern Concept of Epidemiology [Janapadodhwamsa]
- Possess knowledge of Therapeutic effect of Yogic practices and ability to demonstrate various yogasanas in various diseases
- Understanding the role of Ayurved for Immunization, Occupational Health, Geriatrics, Life Style disorders (Non Communicable diseases)

M.D.- Ayurved Vachaspati in

8. ROGA NIDANA

- To understand the Concept and applied aspects of fundamental principles of Rognidan
- To have profound Knowledge of classical Samprapti of all diseases with interpretation of Nidana Panchaka including Upadrava, Arishta and Sadhyasadhyata and Chikitsa Sutra.
- Ability of Ayurvedic interpretation of commonly occurring diseases in contemporary medicine, all relevant findings of modern clinical examinations and various Laboratory and other Diagnostic reports

- Ability of establishment and management of standard clinical laboratory set up
- Have knowledge about Upasargajanya Vyadhi (Communicable diseases)

M.D.- Ayurved Vachaspati in

9. Panchakarma

- To have thorough knowledge of Kayachikitsa, basic principles of Shodhana (BioPurification methods) and Raktamokshana, Physiotherapy & Disease-wise Panchakarma
- To be able to perform poorva, Pradhan & Pashchat karma of Panchakarma procedures [five Purification therapies] of Ayurveda and manage its complications [Updrava].
- To be able to prepare all the necessary bhaishjya kalpana for various panchakarma procedures

M.D.- Ayurved Vachaspati in

10. Kayachikitsa

- To have thorough knowledge of Fundamentals of Kayachikitsa
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- To be able to perform Rogi-Roga Pariksha in Ayurved and Modern perspectives with the help of modern diagnostic parameters.
- To be able to perform samanya and vishesh roga chikitsa including application of advances in Rasayana and Vajikarana therapies and emerging trends in Panchakarma in various disease management
- To have knowledge of Critical care medicine, Management of medical emergencies, ICU services, Field medical services
- To be able to participate in National Health Programmes and recognize prospective role of Ayurveda services and therapeutics in them.

M.D.- Ayurved Vachaspati in

11. KAUMARBHRITYA-BALA ROGA

- Ability to interpret Ayurvedic genetics with Pathogenesis of Modern genetics and management of genetic disorders
- To have thorough knowledge of Neonatal Care and management of all types of neonatal diseases
- To diagnose and manage the Paediatric Disorders
- Ability to develop and manage paediatric ward with Fundamentals of Hospital management

Eligibility

Passing marks for eligibility in admission to ASU&H- PG courses should be as per the ASU&H- PG regulations and should be followed strictly., -

- A person possessing the degree of Ayurvedacharya (Bachelor of Ayurveda Medicine and Surgery) or provisional degree certificate recognized as per the provisions of IMCC 1970/NCISM 2020 act and possess permanent or provisional registration certificate issued by the CCIM/NCISM/state board and must have completed a satisfactorily one year compulsory rotating internship as per the NCISM notification.
- In order to be eligible for admission to post graduate courses it shall be necessary for a candidate to obtain minimum of marks at 50th percentile in the All India AYUSH Post Graduate Entrance Test (AIAPGET) .
- Candidates belonging to the scheduled castes, Scheduled Tribes and other Backward Classes the minimum marks shall be at 40th percentile.

Medium of instruction

The medium of instruction for the programme shall be Sanskrit or Hindi or English with use of Ayurvedic technical terms.

Duration of the Course Study

Total Duration of Course – 3 Years from the Commencement of classes. The maximum duration for completion of the course shall not exceed beyond the period of six years from the date of admission to the course.

Curriculum - As approved by Bharati Vidyapeeth [Deemed to be University], Pune is in line with the directives of the Central Council for Indian Medicine.

Attendance and Progress

The students shall have to attend a minimum of seventy-five per cent. of total lectures, practical's and clinical tutorials or classes to become eligible for appearing in the examination. A Web based centralized biometric attendance system shall be required for the attendance of post-graduate students and manual attendance at department level in which student is pursuing the post-graduate course.

The student shall have to attend the hospital and perform other duties as may be assigned to him during study. The student of clinical subject shall have to do resident duties in their respective departments and student of non-clinical subject shall have duties in their respective departments like Pharmacy or Herbal Garden or Laboratory during study. The student shall attend special lectures, demonstrations, seminars, study tours and such other activities as may be arranged by the teaching departments.

Subjects taught, Number of lectures/ practical and demonstrations for various subjects [MD/MS]

❖ **Specialties in which post-graduate degree is allowed are as under: -**

Sr. No.	Name of speciality	Nearest terminology of modern subject	Department in which postgraduate degree can be conducted
Pre-clinical speciality			
1	Ayurveda Samhita evam Siddhant	Ayurveda Samhita and basic principles of Ayurveda	Samhita and basic principles of Ayurveda
2	Rachana Sharira	Anatomy	Rachana Sharira
3	Kriya Sharira	Physiology	Kriya Sharira
Para-clinical speciality			
4	Dravyaguna Vigyana	Materia Medica and Pharmacology	Dravyaguna
5	Rasa Shastra evam Bhaishajya Kalpana	Ayurveda Pharmaceuticals	Rasa Shastra evam Bhaishajya Kalpana
6	Roga Nidana evam Vikriti Vigyana	Diagnostic Procedure and Pathology	Roga Nidana evam Vikriti Vigyana
Clinical speciality			
7	Prasuti evam Stri Roga	Obstetrics and Gynecology	Prasuti evam Stri Roga
8	Kaumarabhritya –Bala Roga	Pediatrics	Kaumarabhritya– Bala Roga
9	Swasthavritta	Preventive Social Medicine	Swasthavritta and Yoga
10	Kayachikitsa	Medicine	Kayachikitsa
11	Shalya	Surgery	Shalya Tantra
12	Shalaky	Diseases of Eye, Ear, Nose, Throat Head, Neck, Oral and Dentistry	Shalaky Tantra
13	Panchakarma	Panchakarma	Panchakarma
14	Agada Tantra	Toxicology and Forensic Medicine	Agada Tantra.

❖ **Nomenclature of post-graduate degree. -**

The nomenclature of post-graduate degree in respective specialties shall be as under: -

Sl.No.	Nomenclature of specialty or degree	Abbreviation
Pre-clinical specialty		
1	Ayurveda Vachaspati – Ayurveda Samhita Evum Siddhant	M.D. (Ayurveda)- Compendium and Basic Principles
2	Ayurveda Vachaspati – Rachana Sharira	M.D. (Ayurveda) - Anatomy
3	Ayurveda Vachaspati – Kriya Sharira	M.D. (Ayurveda) - Physiology
Para-clinical specialty		
4	Ayurveda Vachaspati – Dravyaguna Vigyana	M.D. (Ayurveda) - Materia Medica and Pharmacology
5	Ayurveda Vachaspati – Rasa Shastra evam Bhaishajya Kalpana	M.D. (Ayurveda) - Pharmaceuticals
6	Ayurveda Vachaspati – Roga Nidana evam Vikriti Vigyana	M.D. (Ayurveda)- Diagnostic procedure and Pathology
Clinical specialty		
7	Ayurveda Dhanvantari – Prasuti evam Stri Roga	M.S. (Ayurveda)- Obstetrics and Gynecology
8	Ayurveda Vachaspati – Kaumarabhritya –Bala Roga	M.D. (Ayurveda)- Pediatrics
9	Ayurveda Vachaspati – Swasthavritta	M.D. (Ayurveda)- Social and Preventive Medicine
10	Ayurveda Vachaspati – Kayachikitsa	M.D. (Ayurveda)- Medicine
11	Ayurveda Dhanvantari – Shalya	M.S. (Ayurveda)- Surgery
12	Ayurveda Dhanvantari – Shalakyia	M.S. (Ayurveda)- Diseases of Eye, Ear, Nose, Throat Head, Neck, Oral and Dentistry
13	Ayurveda Vachaspati – Panchakarma	M.D. (Ayurveda)- Panchakarma
14	Ayurveda Vachaspati – Agada Tantra	M.D. (Ayurveda)- Toxicology and Forensic Medicine

Synopsis and Dissertation

Central Scientific Advisory Post Graduate Committee appointed by Central Council of Indian Medicine shall suggest the areas of Research and topics and the same shall be followed by University Committee while approving the Dissertation title.

The title of the dissertation along with the synopsis, with approval of the Ethics Committee constituted by the institute shall be submitted to the University within a period of six months from the date of admission to the post-graduate course.

If the student fails to submit the title of dissertation and synopsis within specified period, his terms for final post-graduate course shall be extended for six months or more in accordance with the time of submission of the synopsis to the University.

- **Synopsis**

The synopsis of the proposed scheme of work shall indicate the expertise and action plan of work of the student relating to the proposed theme of work, the name of the department and the name and designation of the guide or supervisor and co-guide (if any).

The University shall approve the synopsis not later than three months after submission of the synopsis.

A Board of Research Studies shall be constituted by the University to approve the title.

The University shall display the approved synopsis of dissertation on their website.

- **Dissertation**

Once the title for dissertation is approved by the Board of Research Studies of the University, the student shall not be allowed to change the title of the proposed theme of work without permission of the University.

No student shall be allowed to submit the dissertation before six months of completion of course and the student shall continue his regular study in the institution after submission of dissertation to complete three years.

The dissertation shall consist of not less than forty thousand words.

The dissertation shall contain, at the end, a summary of not more than one thousand and five hundred words and the conclusion not exceeding one thousand words.

Five copies of the bound dissertation along with a certificate from the supervisor or guide shall reach the office of the Registrar of the University four months before the final examination.

The student shall be permitted to appear in the final examination of post-graduate degree course only after approval of the dissertation by the examiners.

Scheme of Examination

The post-graduate degree course shall have two university examinations in the following manner, namely: -

1. The preliminary examination -
2. The final examination –

1.The preliminary examination – Conducted at the end of one academic year after admission.

The subjects/ Number of Papers for preliminary examination namely: -

Paper I- Research Methodology and Bio or Medical Statistics;

Paper II- Applied aspects regarding concerned subjects.

Rules-

The student shall have to undergo training in the department concerned and shall maintain month-wise record of the work done during the last two years of study in the specialty opted by him as under:-

- (a) Study of literature related to specialty,
- (b) Regular clinical training in the hospital for student of clinical subject,
- (c) Practical training of research work carried out in the department, for student of pre-clinical and paraclinical subject,
- (d) Participation in various seminars, symposia and discussions; and (e) progress of the work done on the topic of dissertation.

The assessment of the work done by the students of first year post-graduate course during the first year will be done before the preliminary examination.

Examination shall ordinarily be held in the month of June or July and November or December every year. For being declared successful in the examination, student shall have to pass all the subjects separately in preliminary examination. The student shall be required to obtain a minimum of fifty per cent and marks in practical and theory subjects separately to be announced as a pass. If a student fails in the preliminary examination, he shall have to pass before appearing in the final examination.

2. The final examination -Conducted on completion of three academic years after the admission to postgraduate course.

The final examination shall include dissertation, written papers and clinical or practical and oral examination.

Number of Papers -There shall be four theory papers in each specialty and one practical or clinical and viva-voce examination in the concerned specialty or group of sub-specialties selected by the student for special study.

The student shall publish or get accepted minimum one research paper on his research work in one journal and one paper presentation in regional level seminar.

The preliminary examination and final examination shall be held in written, practical, or clinical and oral examination. If the student fails in theory or practical in the final examination, he can appear in the subsequent examination without requiring submitting a fresh dissertation. The subsequent examination for failed candidates shall be conducted at every six-month interval; and the post-graduate degree shall be conferred after the dissertation is accepted and the student passes the final examination.

M.D.-AYURVEDA

PRELIMINARY PAPER-I
RESEARCH METHODOLOGY AND MEDICAL STATISTICS

PART-A
RESEARCH METHODOLOGY

- 1 Introduction to Research**
 - A. Definition of the term research
 - B. Definition of the term anusandhan
 - C. Need of research in the field of Ayurveda

- 2 General guidelines and steps in the research process**
 - A. Selection of the research problem
 - B. Literature review: different methods (including computer database) with their advantages and limitations
 - C. Defining research problem and formulation of hypothesis
 - D. Defining general and specific objectives
 - E. Research design: observational and interventional, descriptive and analytical, preclinical and clinical, qualitative and quantitative
 - F. Sample design
 - G. Collection of the data
 - H. Analysis of data.
 - I. Generalization and interpretation, evaluation and assessment of hypothesis.
 - J. Ethical aspects related to human and animal experimentation.
 - K. Information about Institutional Ethics Committee (IEC) and Animal Ethics Committee (AEC) and their functions. Procedure to obtain clearance from respective committees, including filling up of the consent forms and information sheets and publication ethics.

- 3 Preparation of research proposals in different disciplines for submission to funding agencies taking EMR-AYUSH scheme as a model.**

- 4. Scientific writing and publication skills.**
 - a. Familiarization with publication guidelines- Journal specific and CONSORT guidelines.
 - b. Different types of referencing and bibliography.
 - c. Thesis/Dissertation: contents and structure
 - d. Research articles structuring: Introduction, Methods, Results and Discussions (IMRAD)

- 5 Classical Methods of Research. Tadvidya sambhasha, vadmarga and tantrayukti**
Concept of Pratyakshadi Pramana Pariksha, their types and application for Research in Ayurveda.

Dravya-, Guna-, Karma-Parikshana Paddhati
Aushadhi-yog Parikshana Paddhati
Swastha, Atura Pariksha Paddhati
Dashvidha Parikshya Bhava
Tadvidya sambhasha, vadmarga and tantrayukti

6 Comparison between methods of research in Ayurveda (Pratigya, Hetu, Udaharana, Upanaya, Nigaman) and contemporary methods in health sciences.

7. Different fields of Research in Ayurveda

- a. Fundamental research on concepts of Ayurveda
- b. Panchamahabhuta and tridosha.
- c. Concepts of rasa, guna, virya, vipak, prabhav and karma
- d. Concept of prakriti-saradi bhava, ojas, srotas, agni, aam and koshta.

8. Literary Research-

Introduction to manuscriptology: Definition and scope. Collection, conservation, cataloguing.

Data mining techniques, searching methods for new literature; search of new concepts in the available literature. Methods for searching internal and external evidences about authors, concepts and development of particular body of knowledge.

9. Drug Research (Laboratory-based)- Basic knowledge of the following:

Drug sources: plant, animal and mineral. Methods of drug identification.

Quality control and standardization aspects: Basic knowledge of Pharmacopoeial standards and parameters set by Ayurvedic Pharmacopoeia of India.

Information on WHO guidelines for standardization of herbal preparations. Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP).

10. Safety aspects: Protocols for assessing acute, sub-acute and chronic toxicity studies. Familiarization with AYUSH guidelines (Rule 170), CDCSO and OECD guidelines.

11. Introduction to latest Trends in Drug Discovery and Drug Development

- Brief information on the traditional drug discovery process
- Brief information on the latest trends in the Drug Discovery process through employment of rational approach techniques; anti-sense approach, use of micro and macro-arrays, cell culture based assays, use of concepts of systems biology and network physiology
- Brief introduction to the process of Drug development

12. Clinical research:

Introduction to Clinical Research Methodology identifying the priority areas of Ayurveda

Basic knowledge of the following:-

Observational and Interventional studies

Descriptive & Analytical studies

Longitudinal & Cross sectional studies

Prospective & Retrospectives studies

Cohort studies

Randomized Controlled Trials (RCT) & their types
Single-case design, case control studies, ethnographic studies, black box design, cross-over design, factorial design.

Errors and bias in research.

New concepts in clinical trial- Adaptive clinical trials/ Good clinical practices (GCP)

Phases of Clinical studies: 0,1,2,3, and 4.

Survey studies -

Methodology, types, utility and analysis of Qualitative Research methods. Concepts of in-depth interview and Focus Group

Discussion.

13. Pharmacovigilance for ASU drugs. Need, scope and aims & objectives. National Pharmacovigilance Programme for ASU drugs.

14. Introduction to bioinformatics, scope of bioinformatics, role of computers in biology. Introduction to Database- Pub med, Medlar and Scopus. Accession of databases.

15. Intellectual Property Rights- Different aspect and steps in patenting. Information on Traditional Knowledge Digital Library (TKDL).

PART-B

40 marks

MEDICAL STATISTICS

Teaching hours: 80

1 **Definition of Statistics :** Concepts, relevance and general applications of Biostatistics in Ayurveda

Collection, classification, presentation, analysis and interpretation of data
(Definition, utility and methods)

2 **Scales of Measurements** - nominal, ordinal, interval and ratio scales.

Types of variables – Continuous, discrete, dependent and independent variables.

Type of series – Simple, Continuous and Discrete

3 **Measures of Central tendency** – Mean, Median and Mode.

4 **Variability:** Types and measures of variability – Range, Quartile deviation, Percentile, Mean deviation and Standard deviation

5 **Probability:** Definitions, types and laws of probability,

6 **Normal distribution:** Concept and Properties, Sampling distribution, Standard Error, Confidence Interval and its application in interpretation of results and normal probability curve.

7 **Fundamentals of testing of hypotheses:**

Null and alternate hypotheses, type I and type 2 errors.

Tests of significance: Parametric and Non-Parametric tests, level of significance and power of the test, 'P' value and its interpretation, statistical significance and clinical significance

8 **Univariate analysis of categorical data:**

Confidence interval of incidence and prevalence, Odds ratio, relative risk and Risk difference, and their confidence intervals

9 Parametric tests:

‘Z’ test, Student’s ‘t’ test: paired and unpaired, ‘F’ test, Analysis of variance (ANOVA) test, repeated measures analysis of variance

10 Non parametric methods:

Chi-square test, Fisher’s exact test, McNemar’s test, Wilcoxon test, Mann-Whitney U test, Kruskal – Wallis with relevant post hoc tests (Dunn)

11 Correlation and regression analysis:

Concept, properties, computation and applications of correlation, Simple linear correlation, Karl Pearson’s correlation co-efficient, Spearman’s rank correlation.
Regression- simple and multiple.

12 Sampling and Sample size computation for Ayurvedic research:

Population and sample. Advantages of sampling, Random (Probability) and non random (Non- probability) sampling. Merits of random sampling. Random sampling methods- simple random, stratified, systematic, cluster and multiphase sampling. Concept, logic and requirement of sample size computation, computation of sample size for comparing two means, two proportions, estimating mean and proportions.

13 Vital statistics and Demography:

computation and applications - Rate, Ratio, Proportion, Mortality and fertility rates, Attack rate and hospital-related statistics

14 Familiarization with the use of Statistical software like SPSS/Graph Pad

PRACTICAL

100 marks

I. RESEARCH METHODOLOGY

Teaching hours 120

PRACTICAL NAME

1 Pharmaceutical Chemistry

Familiarization and demonstration of common lab instruments for carrying out analysis as per API

2 Awareness of Chromatographic Techniques

Demonstration or Video clips of following:

- Thin-layer chromatography (TLC).
- Column chromatography (CC).
- Flash chromatography (FC)
- High-performance thin-layer chromatography (HPTLC)
- High Performance (Pressure) Liquid Chromatography (HPLC)
- Gas Chromatography (GC, GLC)

4 Pharmacognosy

Familiarization and Demonstration of different techniques related to:-Drug administration techniques- oral and parenteral.

Blood collection by orbital plexuses puncturing.

Techniques of anesthesia and euthanasia.

Information about different types of laboratory animals used in experimental research
Drug identification as per API including organoleptic evaluation

5 Pharmacology and toxicology

Familiarization and demonstration of techniques related to pharmacology and toxicology

6 Biochemistry (Clinical)

Familiarization and demonstration of techniques related to basic instruments used in a clinical biochemistry laboratory – semi and fully automated clinical analyzers, electrolyte analyzer, ELISA-techniques, nephelometry.

Demonstration of blood sugar estimation, lipid profiles, kidney function test, liver function test. HbA1, cystatin and microalbumin estimation by nephelometry or other suitable techniques. Interpretation of the results obtained in the light of the data on normal values.

7 Clinical Pathology

Familiarization and demonstration of techniques related to basic and advanced instruments used in a basic clinical

pathology lab. Auto cell counter, urine analyzer, ESR, microscopic examination of urine.

8 Imaging Sciences

Familiarization and demonstration of techniques related to the imaging techniques. Video film demonstration of CT-Scan, MRI-scan and PET-scan.

9 Clinical protocol development

II. MEDICAL STATISTICS

Practical hours:20

Statistical exercise of examples from Topic number 4, 5, 8-12, 14, 15. Records to be prepared.

Distribution of marks (practical):

1. Instrumental spotting test– 20 marks
2. Clinical protocol writing exercise on a given problem– 20 marks
3. Records:Research methodology -10 Mark
4. Medical statistics -10 marks
5. Viva- Voce -40 Marks

REFERENCE BOOKS:-

Pharmacognosy:

1. Aushotosh Kar “Pharmacognosy & Pharmacobiotechnology” New Age International Publisher. Latest Edition. New Delhi.
2. Drug Survey by Mayaram Uniyal
3. Fahn A (1981). Plant Anatomy 3rd Edition Pergamon Press, Oxford
4. Kokate, CK., Purohit, AP, Gokhale, SB (2010). Pharmacognosy. Nirali Prakashan. Pune.
5. Kokate, CK., Khandelwal and Gokhale, SB (1996). Practical Pharmacognosy. Nirali Prakashan. Pune.
6. Trease G E and Evans W C, Pharmacognosy, Bailliere Tindall, Eastbourne, U K.

7. Tyler V C., Brady, L R., and Robers J E., Pharmacognosy, Lea and Febiger, Philadelphia.
8. Tyler VE Jr and Schwarting AE., Experimental Pharmacognosy, Burgess Pub. Co, Minneapolis, Minnesota.
9. Wallis- TE (2011)- reprint. Practical Pharmacognosy (Fourth Edition) Pharma Med Press, Hyderabad.
10. Wallis T E, Analytical Microscopy, J & A Churchill limited, London.
11. Wallis T E., Text Book of Pharmacognosy, J & A Churchill Limited, London.
12. WHO guidelines on good agricultural and collection practices- (GACP) for medicinal plants (2003). World Health Organization- Geneva.
13. WHO monographs on selected medicinal plants (1999)—Vol. 1. 1.Plants, Medicinal 2.Herbs 3.Traditional medicine. ISBN 92 4 154517 8. WHO Geneva.

Pharmaceutical chemistry, quality control and drug standardization:

1. Ayurvedic Pharmacopoeia of India. Part I- volume 1 to 8 and Part II- volume 1 to 3. Ministry of Health and Family Welfare. Controller of Publication. Govt of India. New Delhi.
2. Brain, KR and Turner, TD. (1975). The Practical Evaluation Phytopharmaceuticals. Wright Sciencetechnica, Bristol.
3. Galen Wood Ewing (1985). Instrumental Methods of Chemical Analysis. McGraw-Hill College ;Fifth edition
4. Harborne, JB (1973). Phytochemistry Methods. Chapman and Hall, International Edition, London.
5. HPTLC- Fingerprint atlas of Ayurvedic Single Plant Drugs mentioned in Ayurvedic Pharmacopoeia Vol- III and IV. CENTRAL COUNCIL FOR RESEARCH IN AYURVEDA AND SIDDHA. New Delhi.
6. Kapoor, RC (2010). Some observations on the metal based preparations in Indian System of Medicine. Indian Journal of Traditional Knowledge. 9(3): 562-575
7. Khopkar, S. M. Analytical Chemistry, New Age International Publishers , 3 rd edition
8. Laboratory Guide for- The Analysis of Ayurved and Siddha Formulations – CCRAS, New Delhi.
9. Mahadik KR, Bothara K G. Principles of Chromatography by, 1st edition, Nirali Prakashan.
10. Qadry JS and Qadry S Z., Text book of Inorganic Pharmaceutical and Medicinal Chemistry, B. S.Shah Prakashan, Ahmedabad.
11. Quality Control Methods for Medicinal Plant Material. Reprint (2002). WHO- Geneva.
12. Rangari V.D., Pharmacognosy & Phytochemistry, Vol I, II, Career Publication,
13. Sharma BK. Instrumental Methods of Chemical Analysis by, Goel Publishing House.
14. Srivastav VK and Shrivastav KK. Introduction to Chromatography (Theory and Practice)
15. Stahl E., Thin Layer Chromatography - A Laboratory Handbook, Springer Verlag, Berlin.
16. Sukhdev Swami Handa, Suman Preet Singh Khanuja, Gennaro Longo and Dev Dutt Rakesh (2008).Extraction Technologies for Medicinal and Aromatic Plants -INTERNATIONAL CENTRE FOR SCIENCE AND HIGH TECHNOLOGY- Trieste,

Biochemistry and Laboratory techniques:

1. Asokan P. (2003) Analytical Biochemistry, China publications,
2. Campbell, P.N and A.D .Smith, Biochemistry Illustrated, 4th ed, Churchill Livingstone.
3. David Frifelder. W. H. Freeman. (1982). Physical Biochemistry by; 2 edition

4. David Sultan (2003). Text book of Radiology and Imaging, Vol-1, 7th Edition.
5. Deb, A.C., Fundamentals of Biochemistry, Books and Allied (P) Ltd, 2002.
6. Harold Varley. Practical Clinical Bio-chemistry
7. Kanai L. Mukherjee. Clinical Pathology; Medical Laboratory Technology Vol. I. Tata McGrawHill 1996, New Delhi.
8. Gradwohl, Clinical Laboratory-methods and diagnosis, Vol-I
9. Clinical Biochemistry -Sabitri Sanyal, Clinical Pathology, B.I. Churchill Livingstone (P) Ltd, New Delhi. 2000.
10. Satyanarayanan, U. Essentials of Biochemistry, Books and allied (P) Ltd. 2002
11. Zubay, G.L. Biochemistry, W.M.C. Brown Publishers, New York 1998.
12. Text book of Radiology and Imaging, Vol-1, David Sultan, 7th Edition. 2003.

Research methodology:

1. Alley, Michael. The craft of scientific writing. Englewood Cliffs. N.N. Prentice 1987.
2. Ayurvediya Anusandhan Paddhati – P.V. Sharma
3. Altick and Fenstermaker. (2007). *The Art of Literary Research*. 4th ed. W. W. Norton. Castle, Gregory. *Blackwell Guide to Literary Theory*. Blackwells,
4. Bowling, A. (2002). *Research Methods in Health* (2nd ed). Buckingham: Open University Press.
5. Day R.A. How to write a scientific paper. Cambridge University Press.
6. Cooray P.G. Guide to scientific and technical writing.
7. Deepika Chawla and Neena Sondhi. (2011). *Research Methods- Concepts and cases*. New Delhi: Vikas Publishing House.
8. Greenhalgh, T. (2006) *How to Read a Paper: The Basics of Evidence-Based Medicine*. (3rd ed) Blackwell
9. Kothari- CR (2004). *Research Methodology- Methods and Techniques* (Second Revised Edition). New Age International Publishers- New Delhi.
10. Kumar, R. 2005. *Research Methodology: a Step-by-Step Guide for Beginners, 2nd ed*. Thousand Oaks, CA, London: Sage Publications.
11. Petter Laake, Haakon Breien Benestad and Bjørn Reino Olsen. (2007). *Research Methodology in the Medical and Biological sciences*. Academic Press is an imprint of Elsevier, 84 Theobald's Road, London WC1X 8RR, UK. ISBN: 978-0-12-373874-5
12. Relevant portions of Ayurvedic Samhitas and other texts

Drug research and development:

1. RICK NG, (2009). *DRUGS- from discovery to approval*. John Wiley & Sons, Inc., Hoboken, New Jersey
2. Research guidelines for evaluating the safety and efficacy of herbal medicines. (1993). . WHO- (Regional Office for the Western Pacific – Manila) ISBN 92 9061 110 3 (NLM Classification: WB925).
3. Jagdeesh, Sreekant Murthy, Gupta, YK and Amitabh Prakash Eds. *Biomedical Research (From Ideation to Publication)* (2010). Wolters Kluwer/ Lippincott Williams and Wilkins.
4. WHO Guidelines on Safety Monitoring of herbal medicines in pharmacovigilance systems. (2004). WHO- Geneva. ISBN 92 4 1592214.
5. Natural products isolation. (2006) 2nd ed. / edited by Satyajit D. Sarker, Zahid Latif, Alexander I. Gray. (Methods in biotechnology; 20). Includes bibliographical references and

index. Humana Press Inc. ISBN 1-58829-447-1 (acid-free paper) – ISBN 1-59259-955-9 (eISBN)

6. Gazette Extraordinary Part- II-Section 3 - Sub section (i) December 2008. Govt of India. AYUSH Guidelines on safety studies- Rule 170 of Drugs and Cosmetics Act.
7. OECD (2000) Guidance Document on Acute Oral Toxicity. Environmental Health and Safety Monograph Series on Testing and Assessment No 24.
8. OECD Guideline for the Testing of Chemicals – Repeated Dose 90-day Oral Toxicity Study in Rodents, 408, 1998. <http://browse.oecdbookshop.org/oecd/pdfs/free/9740801e.pdf> (latest version)
9. OECD Series on Principles of Good Laboratory Practice (GLP) and Compliance Monitoring, 1998. http://www.oecd.org/document/63/0,2340,en_2649_34381_2346175_1_1_1_1,00.p hp
10. ICH Harmonised Tripartite Guideline (2000). Maintenance of the ICH Guideline on Non-clinical Safety Studies for the conduct of Human Clinical Trials for Pharmaceuticals M3 (R1).
11. Ghosh M.N.: Fundamentals of Experimental Pharmacology, *Scientific Book Agency, Bombay.*
12. Jaju B.P.: Pharmacological Practical Exercise Book, *Jaypee Brothers, New Delhi.*
13. Kulkarni S.K.: Hand Book of Experimental Pharmacology, *Vallabh Prakashan, New Delhi*
14. Ravindran R.: X-Pharm (Software), Indian Journal of Pharmacology, *JIPMER, Pondicherry.*

Biotechnology and Bio-informatics:

1. Angela M. Meireles A (2009). Extracting Bioactive compounds for food products. Theory and applications. CRC- Press Taylor and Francis Group.
2. Bergeron BP 2002 Bioinformatics Computing 1st Edition, Prentice Hall
3. Chikhale, N.J. and Virendra Gomase, Bioinformatics- Theory and Practice, Publisher: Himalaya Publication House, India; 1 edition (July, 2007) ISBN-13: 978-81-8318-831-9
4. Lesk, A.M. Introduction to Bioinformatics Oxford 2002.
5. Satyanarayana, U.: Biotechnology, Books and Allied (P) Ltd, Kolkata, 2005
6. Setubal J. C and J. Meidanis, Introduction to Computational Molecular Biology, PWS Publishing Company, 1997.
7. <http://www.iitb.ac.in/~crnts>.
8. <http://www.zygogen.com>.
9. <http://www.dsir.nic.in/reports/tifp/database/metallo.pdf>.
10. www.consort-statement.org
11. www.strobe-statement.org
12. www.icmr.nic.in

Clinical Evaluation:

1. CDSCO, Good Clinical Practices For Clinical Research in India, Schedule Y (Amended Version –2005), <http://cdsco.nic.in/html/GCPI.php>
2. Ethical Guidelines for Biomedical Research on Human subjects. (2000). Indian Council of Medical Research- New Delhi.
3. Gallo P., Chuang-Stein C., Dragalin V., Gaydos B., Krams M., Pinheiro J. Adaptive Designs

in Clinical Drug Development—An Executive Summary of the PhRMA Working Group. *Journal of Biopharmaceutical Statistics*. 16: 275–283; 2006

4. Good Clinical Practices- (2001). Guidelines for Clinical Trial on Pharmaceutical Products in India. Central Drugs Standard Control Organization. Directorate General of Health Services. New Delhi. (<http://WWW.cdsc.nic.in.ich.org>)
5. Gupta, SK Ed. Basic Principles of Clinical Research and Methodology (2007). Jaypee Brothers-new Delhi
6. ICH Harmonised Tripartite Guidelines for Good Clinical Practices.(1997)- Quintiles- Published by Brookwood Medical Publications. Richmond, Surrey. United Kingdom.
7. NCI. *Clinical Trials Education Series*. <http://www.cancer.gov/clinicaltrials/learning/clinical-trials-education-series>, 2001.
8. Petter Laake, Haakon Breien Benestad and Bjørn Reino Olsen. (2007). Research Methodology in the Medical and Biological sciences. Academic Press is an imprint of Elsevier, 84 Theobald's Road, London WC1X 8RR, UK. ISBN: 978-0-12-373874-5
9. William C. Scheffer Introduction to Clinical Researchs

Medical Statistics:

1. Armitage, P. and Berry, G. (1994) Statistical Methods in Medical Research (3rd ed). Blackwell Science.
2. Armitage P, Berry G, Matthews JNS: *Statistical Methods in Medical Research*. Fourth edition. Oxford, Blackwell Science Ltd; 2002
3. Bland, M. (2000) An Introduction to Medical Statistics (3rd ed). Oxford: Oxford University Press.
4. Bradford Hill – Basic Medical Statistics
5. Cambell, M.J. and Machin, D. (1993) Medical Statistics: A Common Sense Approach (2nd ed). Chester: Wiley.
6. Dwivedi S. N., Sundaram K. R and V. Sreenivas (2009). Medical Statistics - Principles & Methods-BI Publications Pvt. Ltd., New Delhi –1.
7. Gupta S.P. - Fundamentals of statistics, Sultan Chand. Delhi.
8. Indrayan. (2008). Basic Methods of Medical Research. AITBS Publishers- India
9. Mahajan B K, Methods in Bio statistics for medical students, 5th Ed. New Delhi, Jaypee Brothers Medical Publishers
10. Mehdi, B and Prakash A. (2010). Biostatistics in Pharmacology. Practical Manual in experimental and clinical pharmacology. 1st Edition. New-Delhi: Jaypee brothers Medical Publishers
11. Rao, NSN and Murthy, NS. (2008) 2nd Edition. Applied statistics in health sciences. Jaypee Brothers Medical Publishers (P) Ltd. Bengaluru, New Delhi.
12. Rick J Turner and Todd A Durham (2008). Introduction to Statistics in Pharmaceutical Clinical trials. Published by the Pharmaceutical Press- An imprint of RPS Publishing, 1 Lambeth High Street, London SE1 7JN, UK
13. Symalan, K. (2006). Statistics in Medicine (First Edition) Trivandrum: Global Education Bureau.
14. Sundar Rao, Jesudian Richard - An Introduction to Biostatistics.
15. Suhas Kumar Shetty- Medical statistics made easy

M.D.-AYURVEDA PRELIMINARY
RASA SHASTRA AND BHAISHAJYA KALPANA
(Iatrochemistry & Pharmaceuticals Science)
PAPER-II

Theory 100 marks

PART-A 50 marks

1. Fundamental principles of Rasa Shastra and Bhaishajya Kalpana, introduction to Rasachikitsa, Ashuddha and Apakwa Bhasma- sevan Doshha and its management, introduction to Aushadha Sevan Kaal and Prayoga Marga (routes of administration).
2. Introduction to basic principles of Aushadha Yoga (formulations).
3. Classification of Rasa Dravya - concept and relevance.
4. Introduction to principles of Aushadha Nirmana, concept of Shodhan, Marana, Jarana, Murcchhana, Sattvapatan and Amritikarana.
5. Concept of Kashaya, Panchavidha Kashaya and other Kalpana.
6. Concept of Rasashala, Rasa Mandapa with introduction to pharmacy in accordance with the Good Manufacturing Practices (GMP).
7. Critical study of Rasa Ratnasamuchchaya, Rasendra Chintamani, Rasa Tarangini, Sharngadhara Samhita, Chakradutta and Bharat Bhaishajya Ratnakara with special reference to Aushadha-Nirmana.

PART-B 50 marks

1. Introduction to methods of analytical, toxicity, experimental and clinical validation of classical and proprietary Ayurvedic formulations.
2. Introduction to new dosage forms.
3. Introduction to advance instruments of analysis like XRD, XRF, SEM-E-Dax, ICP analysis, Chromatography: TLC, gas chromatography, HPTLC, concept of Nanotechnology and its relevance to Aushadha-Nirman.
4. Concept of Pharmacopoeia and Formulary with introduction of 'The Ayurvedic Pharmacopoeia of India' (API) and 'The Ayurvedic Formulary of India' (AFI).
5. Introduction to databases of medicinal plants published by CCRAS, ICMR and others.

PRACTICAL 100 marks

Contents:

1. Shodhan, Marana, Amritikarana of Rasa Dravya (10 practicals)
2. Preparation of different dosage forms (10 forms)
3. Pharmacopoeial standards of raw and prepared drugs (20 practicals)

Raw Materials

1. Minerals and Metals

Mineralogical Identification Mineralogical Identification

1. Physical form - Crystal and Amorphous
2. Hardness on Moh's scale
3. Brittleness test

4. Fracture and Cleavage
5. Streak test
6. Luster

2. Plant Material

Macroscopic and Microscopic examination

- a. Organoleptic testing
- b. Estimation of Foreign materials
- c. Microbial load
- d. Moisture content
- e. Determination of ash value - total, water soluble and acid Insoluble ash
- f. Specific gravity
- g. Solubility- water and alcohol
- h. Extract values- water and alcohol
- i. TLC
- j. Determination of optical density
- k. Refractive index
- l. Aflatoxins
- m. Limit tests for heavy metals
- n. pH estimation

Prepared dosage forms:

1. Solid dosage forms Rasaushadhi

- a) Bhasma and Pishti Pariksha
- b) Determination of Particle size
- c) Limit tests for heavy metals
- d) Determination of moisture content, specific gravity, pH and acid value.

Kasthaushadhi

a. Powders (Churna)

1. Particle size
2. Bulk density
3. Solubility
4. Estimation of Foreign material
5. Microbial load
6. Moisture content
7. Determination of ash value - total, water soluble and acid insoluble ash
8. Solubility - water and alcohol
9. Extract values - water and alcohol
10. TLC
11. Determination of Optical density
12. Refractive Index
13. Aflatoxins
14. Limit tests for Heavy metals

15. pH Value estimation

b. Tablets

1. Uniformity in weight and size
2. Tablet hardness
3. Tablet friability
4. Tablet disintegration
5. Tablet dissolution

c. Semisolid dosage forms

- a. Moisture content
- b. Sugar content
- c. Microbial load

d. Liquids

- pH value
- Specific gravity
- Determination of refractive index
- Acid value
- Viscosity
- Saponification value
- Iodine value

Note:

- All practicals should be performed in accordance with Authoritative Text Books of Schedule-I of D.C.Act-1940.
- All practicals related to Pharmacopoeial Standards should be performed in accordance with Methods Published in Protocol for testing of ASU Medicines and Laboratory Guidelines for the Analysis of Ayurveda & Siddha Formulations published by Deptt. of AYUSH, Government of India.

Distribution of marks (Practical)

- Practical Record Book - 10 Marks
- Practicals related to Preparation of Drugs
 - o Major practical- one - 20 Marks
 - o Minor practical- one - 10 Marks
- Drug analysis
 - o Major practical- one - 20 Marks
 - o Minor practical- one - 10 Marks
- Spotting - 10 Marks
- Viva-voce - 20 Marks

REFERENCE BOOKS:

1. Rasahridaya Tantra
2. Rasarnava

3. Rasaratna Samuccahaya
4. Ayurved Prakasha
5. Rasendrachudamani
6. Rasendra Chintamani
7. Rasatarangini
8. Rasaprasaksha Sudhakar
9. Rasamrita
10. Rasa Chandanshu : CCRAS Publication
11. Sharangadhara Samhita
12. Sharangadhara Darpan (BP Pandey)
13. Bhavaprakasha
14. Yoga Ratnakara
15. Bhaishajya Ratnavali
16. Siddha Bhaishajya Manimala
17. Bharat Bhaishajya Ratnakara
18. Rasayoga Sagara
19. Siddha Bhaishajya Manimala
20. Sahasrayoga
21. Siddha Yoga Sangraha – Yadavaji Trikamji Acharya
22. Vaidyaka Paribhasha Pradeepa
23. Ayurvediya Aushadhikarana – Puranik and Dhamanakar
24. Dravyaguna Vijnan Part - 1 and 2 - Yadavji Trikamji
25. Chakradatta - Ratnaprabha, Relevant Parts from Charaka Samhita, Sushruta Samhita, Kashyapa Samhita, Ashtanga Sangraha, Ashtanga Hridaya,
26. Remington: Science and Practice of Pharmacy
27. Theory and Practice of Industrial Pharmacy – Leon Lachman et al
28. Clinical Pharmacology, KD Tripathi
29. Clinical Pharmacology, Lawrence Benette
30. Drug Discovery and Evaluation (Pharmacological assays) HG Vogel
31. Pharmacological Basis of therapeutics – Goodman and Gilman
32. Data Base of Medicinal Plants of CCRAS
33. Quality and Standards of Medicinal Plants – ICMR publication
34. Quality Control of Ayurvedic Drugs – PLIM, Gaziabad
35. Ayurvedic Pharmacopeia of India
36. Ayurvedic Formulary of India
37. Indian Pharmacopeia
38. British Pharmacopeia
39. United States Pharmacopeia
40. Pharmacopeia Codex
41. Current Good Manufacturing Practices
42. Drugs and Cosmetic Act 1940 and Rules 1945 with latest amendments
43. Drugs and Magic remedies (Objectionable advertisement) Act-1954
44. Prevention of Food Adulteration (PFA) act
45. Laws pertaining to Narcotics

46. Factory and Pharmacy Acts
 47. Consumer Protection Act -1986
 48. Brief information on the peer reviewed journals, official websites and other official search engines along with their links (related with the subject)
 49. Rutleys Elements of Mineralogy
 50. Bhasma Vigyaniam
 51. Kupipakva Vigyaniam
 52. Anupana Manjari
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M.D.-AYURVEDA FINAL

RASA SHASTRA AND BHAISHAJYA KALPANA

(Iatrochemistry & Pharmaceuticals Science)

RASA SHASTRA AND BHAISHAJYA KALPANA

Paper I Rasa Shastra

Part A

1. History and Chronological evolution of Rasashastra, concept of Raseshwara darshan. Fundamental Principles of Rasashastra Technical terminologies (Paribhasha) used in Rasa shastra.
2. Detailed knowledge of ancient and contemporary Yantropakarana and their accessories used in aushadhikaran and their contemporary modification such as yantras, mushas, putas, Koshtis, bhrashtis, muffle furnaces and other heating appliances, ovens, driers etc. used in manufacturing of Rasaushadhis in small scale and large scale along with their applications.
3. Study of Samskara, Role of agni (Heat), jala and other dravas (water and other processing liquids), kala (Time span), paatra (container) etc. and their significance in aushadhikarana.
4. Concept of Bhavana, study of Mardana and its significance and knowledge of ancient and contemporary grinding techniques.
5. Detailed Knowledge of different procedures of Shodhana, Jarana Murchana and Marana, concept of Puta, definition, types and specifications of different Putas. Significance of different Putas in relation to Bhasmikanana and therapeutic efficacy of dravya under process. Bhasma pariksha vidhi and its significance in relation to contemporary testing procedures. Amritikaran and Lohitikarana.
6. Detailed knowledge of Satva and Druti, Satva shodhan, mrudukaran and Maran of Satva, its significance, in relation to therapeutic efficacy of dravya under process.
7. Concept of Pratinidhi dravya and discussion on controversial drugs.

PART – B

1. Detailed ancient and contemporary knowledge of Parada and its compounds with reference to source, occurrence, physico-chemical characterization, graahya agraahyatva, Parada dosha, Parada gati, Parada shodhan, Study of Ashta sanskara, ashtadasha sanskara etc., Hingulottha Parada. Concept of Parada jaran, moorchana, bandhan, pakshachheda and marana etc. Therapeutic properties and uses of Parada.
2. Detailed ancient & contemporary knowledge with Geochemical / mineralogical / biological identification, source, occurrence, physico-chemical characterization, graahya-agraahyatva, Shodhan Maranadi vidhi and therapeutic properties and uses of dravyas etc. included in Maharasa, Uparasa, Sadharana rasa, Dhatu, Upadhatu,

Ratna, Uparatna, Visha, Upavisha, Sudha varga, Lavana varga, Kshara varga, Sikata varga and other miscellaneous drugs used in Rasashastra.

3. Detailed knowledge of manufacturing, pharmacopeial standards, storage, shelf life, therapeutic efficacy, dose, anupana, vikarashanti upaya and development of technology with Standard Operating Procedures of processing, standardization, quality control of Bhasmas and Pishtis

Bhasma - Abhraka Bhasma, Svarnamakshika Bhasma, Kasis Bhasma, Svarna Bhasma, Rajata Bhasma, Tamra Bhasma, Loha Bhasma, Mandur Bhasma, Naga Bhasma, Vanga Bhasma, Yashad Bhasma, Trivanga Bhasma, Pittala, Kamsya and Varthaloha Bhasma, Shankha Bhasma, Shukti Bhasma, Kapardika Bhasma, Godanti Bhasma, Praval Bhasma, Mrigashringa Bhasma, Mayurpiccha Bhasma, Kukkutand twak Bhasma, Hiraka Bhasma, Manikyā Bhasma.

Dravaka - Shankha Dravaka

Pishti - Praval pishti, Manikyā Pishti, Mukta pishti, Jahara mohara pishti, Trinakanta mani pishti etc.

4. Detailed knowledge of manufacturing, storage, shelf life, pharmacopeial standards, therapeutic efficacy, dose, anupana and development of technology with Standard Operating Procedures of processing, standardization and quality control of Kharaliya rasa, Parpati, Kupipakva rasa and Pottali rasa.
5. Study of classical texts with respective commentaries and special emphasis on Rasarnava, Rasahridaya tantra, Rasa Ratna Samucchaya, Rasendra Chintamani, Rasendra Chudamani, Rasa Ratnakara, Rasadhyaya, Rasa Kamdhenu, Anandkanda, Siddha Bhesaja Manimala, Ayurveda Prakash, Rasatarangini, Bhaishajya Ratnavali, Rasamritam etc. and the books mentioned in the Schedule I of D & C Act – 1940. Relevant portions of Brihatrayi.

Paper II Bhaishajya Kalpana

Part A

1. History and Chronological evolution of Bhaishajya Kalpana, Concept of Bhesaja and Aushadh, fundamental principles of Bhaishajya Kalpana. Technical terminologies (Paribhasha) used in Bhaishajya Kalpana.
2. Classical and Contemporary concepts of Collection, storage, Saviryata Avadhi and preservation methods of different fresh and dry Aushadhi dravyas and their graahya agraahyatva
3. Detailed knowledge of routes of drug administration, Aushadha matra, Anupana, Sahapana, Aushadha Sevana Kala, Kala Avadhi, Pathya, Apathya (Posology).
4. Detailed knowledge of manufacturing, standardization, quality control, pharmacopeial standards, storage, shelf life and development of innovative technology with Standard manufacturing Operating Procedures of following dosage forms

- i) Panchavidha Kashaya, Churna, Rasakriya, Ghana, Avaleha, Pramathya, Mantha, Panaka, Sarkara, Kshirapaka, Ushnodaka, Aushadha Siddha Udaka, Sadangodaka, Tandulodaka, Laksharasa, Arka, Satva, Kshara, Lavana, Masi, Gutika, Vatika, Modaka, Guggulu and Varti etc.
- ii) Sneha Kalpana: Concept of accha sneha and sneha pravicharana and Murchhana. Sneha paka, types of sneha paka and sneha siddhi lakshana, Avartana. Sneha kalpa karmukata (Pharmacokinetics and dynamics of sneha kalpa). Role of Sneha in relation to absorption of drug.
- iii) Kritanna and Bhesaja Siddha Anna Kalpana, Aharopayogi varga, concept of medicinal and functional food, dietary supplements and nutraceuticals etc. iv) Sandhana kalpana: Madya varga and Shukta varga. Asava yoni. Alcoholic and acidic fermentation. Sandhana kalpa karmukata (Pharmacokinetics and dynamics). Advancements in fermentation technology. Knowledge of regulations in relation to alcoholic drug preparations.
- v) Bahya Prayogartha Kalpana : Lepa, Upanaha, Udvartan, Avachurnana / Avadhulana, Abhyanga, Dhupana, Malahara.
- vi) Mukha, Karna, Nasa, Netropacharartha Kalpana:
- vii) Basti Kalpana: Basti Yantra Nirmana, Types of basti. Anuvasana and Asthapana basti. Karma, kala and yoga basti etc. Basti Kalpa (Madhutailika, Piccha basti etc.), Comparison of Asthapana and Anuvasana basti with evacuation and retention enema.

Part B

All the following procedures are to be studied in relevance to Ayurvedic Bhaishajya Kalpas.

1. Methods of Expression and Extraction: Maceration, percolation, distillation, infusion and decoction.
2. **Liquids:** Clarified liquid, syrup, elixir, filtration techniques
3. **Solid dosage Forms: Powders:** Size reduction, separation techniques, particle size determination, principles of mixing. **Tablets:** Methods of tableting, suppositories, pessaries and capsules, sustained release dosage forms.
4. **Semisolid dosage forms,** emulsions, suspensions, creams and ointments, sterilization of ophthalmic preparations.
5. An introduction to various cosmetic preparations.
6. Drying, open and closed air drying, freeze drying, vacuum drying and other drying methods pharmaceutical excipients.
7. Study of classical texts with special emphasis on Chakradatta, Sharangadhara Samhita, Bhaishajya Ratnavali, Bhava Prakasha, Yogaratnakara, relevant portions of Brihatrayi, Ayurvedic Pharmacopeia of India, Ayurvedic Formulary of India.

Paper III Rasa Chikitsa & Aushadha Yoga Vigyana

PART- A

1. Rasachikitsa, Kshetrikaran, Rasajirna, Lohajirna, Aushadhi Sevana Vikarashanti Upaya. Ashuddha, Apakva, Avidhi Rasadravya Sevanajanya Vikara evam Vikara shanti upaya.
2. Detailed knowledge of Aushadhi patha Nischiti and sanyojan (formulation composition), dose, anupana and method of administration, therapeutic efficacy and uses (indications and contra-indications), probable mode of action etc. of the following Aushadhi yogas
 - i. **Kharaliya Rasa :** Shwasa kuthara Rasa, Tribhuvana kirti Rasa, Higuleshwara Rasa, Ananda bhairava Rasa, Maha Lakshmvilasa Rasa, Vasnata kusumakara Rasa, Vasanta multi Rasa, Brihat vata chintamani Rasa, Laghu suta shekhar Rasa, Suta shekhara Rasa, Ram ban Rasa, Chandra kala Rasa, Yogendra Rasa, Hridyarnava rasa, Grahani kapata Rasa, Garbha pala Rasa, Jalodarari Rasa, Mrityunjaya Rasa, Madhumalini vasanta Rasa, Arsha kuthara Rasa, Krimi mudgara Rasa, Suchika bharana Rasa, Tri netra Rasa, Smruti sagara Rasa, Vata gajankusha Rasa, Agni kumar Rasa, Ekangavir Rasa, Kama dughha Rasa, Purna chandrodaya Rasa, Pratap lankeshwara Rasa, Maha vata vidhwansaka Rasa, Kasturi bhairava Rasa, Ashwa kanchuki Rasa, Gulma kuthara Rasa, Maha jwarankusha Rasa, Chandra mrita Rasa, Kapha ketu Rasa, Prabhakara Vati, Pravala Panchamrita, Gandhaka Rasayana, Chaturbhuj rasa, Navajivan rasa, Shonitargal rasa, Raktapitta kulakandan rasa, Amavatari Rasa, Kravyada Rasa, Garbha chintamani Rasa, Chintamani Rasa, Trilokya chintamani Rasa, Pradarantaka Rasa, Vangeshwara Rasa, Brihat vangeshwara Rasa, Shwasakasa Chintamani Rasa, Arogya vardhini Vati, Chandra prabha Vati, Agni tundi vati, Shankha Vati.
 - ii. **Kupipakva Rasa:** Rasa Sindura, Makaradhwaja, Sidha makaradhwaja, Samira pannaga Swarnavanga, Malla sindura, Rasa karpura, Rasa pushpa, Manikya Rasa.
 - iii. **Parpati Rasa :** Rasa Parpati, Loha Parpati, Tamra Parpati, Suwarna Parpati, Gagana Parpati, Vijay Parpati, Panchamrit Parpati, Shwet Parpati, Bola Parpati iv.
- Pottali Rasa:** Rasagarbha pottali, Hemagarbha pottali, Mallagarbha pottali, Hiranyagarbha pottali, Shankagarbha pottali, Lokanatha rasa, Mriganka Pottali
- v. **Loha evam Mandura Kalpa:** Ayaskriti, Loha Rasayana, Amla pittantaka loha, Chandanadi loha, Dhatri loha, Navayasa loha, Putapakva vishama jwarantaka loha, Shilajatwadi loha, Tapyadi loha, Saptamrita loha, Dhatri loha Amritasara Loha, Shankaramat loha, Pradarantaka loha, Rohitaka loha. Punarnava Mandura, Shatavari Mandura, Tara Mandura, Triphala Mandura, Mandura Vataka etc.

Part B

Detailed knowledge of Aushadhi patha Nischiti and sanyojan (formulation composition), dose, anupana and method of administration, therapeutic efficacy and uses (indications and contra-indications), probable mode of action etc. of the following Aushadhi yogas

- i. **Panchavidha Kashayas and their Upakalpa:** Ardraka swarasa, Tulasi swarasa, Vasa putapaka swarasa, Nimba kalka, Rasona kalka, Kulattha Kwath, Punarnavasthaka kwatha, Rasna saptaka kwatha, Dhanyak hima, Sarivadi hima, Panchakola phanta, Tandulodaka,

Mustadi pramathya, Kharjuradi mantha, Shadanga paniya, Laksha rasa, Arjuna kshirapaka, Rasona kshirapaka, Chinchapanaka, Candanapanaka, Banapsha sharkara, Nimbu sharkara, Amrita satva, Ardraka satva, Ajamoda arka, Yavanyadi arka **ii. Kritanna and Bhesaja Siddha Ahara Kalpana:** Yavagu, (Krita and Akrita), Ashtaguna manda, Laja manda, Peya, Vilepi, Krishara, Yusha, Mudga yusha, Kulattha yusha, Saptamushtika yusha, Khada, Kambalika, Raga, Shadava, Mamsarasa, Veshavara, Dadhi, Katvar Dadhi, Dadhi Mastu, Takra, Ghola, Udasvita, Mathita, Chhacchika etc.

- iii. Churna:** Sitopaladi Churna, Talisadi Churna, Triphala Churna, Hingvashtaka Churna, Avipattikara Churna, Swadishta Virechana Churna, Bhaskar Lavana Churna, Sudarshana Churna, Maha Sudarshana Churna, Gandharva Haritaki Churna, Pushyanuga Churna, Ajamodadi Churna, Hingvadi Churna, Eladi Churna, Dadimashtaka Churna, Trikatu Churna, Vaishwanara Churna, Gangadhara Churna, Jati phaladi Churna, Narayana Churna etc.
- iv. Gutika:** Arogya vardhani vati, Chandra prabha vati, Chitrakadi Gutika, Sanjivani Vati, Lasunadi vati, Lavangadi Vati, Vyoshadi vati, Khadiradi Vati, Kankayana Vati, Abhayadi modaka, Marichyadi gutika, Amalakyadi gutika, Samshamini Vati, Kutaja Ghana vati, Amarasundari Vati, Shiva Gutika, Eladi Vati, Kasturyadi Gutika, Arshoghni Vati.
- v. Guggulu:** Yogaraja Guggulu, Maha yogaraja Guggulu, Trayodashanga Guggulu, Kanchanara Guggulu, Rasnadi Guggulu, Triphala Guggulu, Simhanada Guggulu, Gokshuradi Guggulu, Kaishora Guggulu, Panchatikta Guggulu, Amritadi Guggulu, Vatari Guggulu, Lakshadi Guggulu, Abha Guggulu, Navaka Guggulu, Nava Karshika Guggulu.

vi. Sneha Kalpa

Sneha Moorchhana - Ghrita Murchhana, Taila Murchhana

Siddha Ghrita - Shatavari Ghrita, Jatyadi Ghrita, Phala Ghrita, Dadimadi Ghrita, Kshirashatpala Ghrita, Mahatriphala Ghrita, Dhanvantari Ghrita, Amritaprasha Ghrita, Kalyanaka Ghrita, Brahmi Ghrita, Changeri Ghrita, Panchatikta Ghrita, Sukumara Ghrita, Panchagavya Ghrita

Siddha Taila - Maha Narayana Taila, Maha Masha Taila, Bala Taila, Nirgundi Taila, Shadbindu Taila, Vishagarbha Taila, Sahacharadi Taila, Jatyadi Taila, Apamarga Kshara Taila, Tuvaraka Taila, Kshirabala Taila (Avartita), Lakshadi Taila, Anu Taila, Kumkumadi Taila, Hingutriguna Taila, Kottumchukadi Taila, Prasarinyadi Taila, Dhanwantari Taila, Balashwagandhadi Taila, Balaguduchyadi Taila, Nilibhringyadi Taila, Brihadavadi Taila, Irimedadi Taila, Chandanadi Taila, Panchaguna taila, Arka taila, Pinda Taila, Kasisadya Taila

- vii. Rasakriya, Avaleha, Khanda etc.:** Darvi Rasakriya, Vasa Avaleha, Brahma rasayana, Chyavanprasha Avaleha, Kushmanda Avaleha, Dadima Avaleha, Bilvadi Avaleha, Kantakaryavaleha, Haridra Khanda, Narikela khanda, Saubhagya shunthi paka, Amrita Bhallataka, Kamsa Haritaki, Chitraka Haritaki, Vyaghri Haritaki, Bahushala Guda, Kalyana Guda
- viii. Sandhana Kalpa:** Lodhrasava, Kumaryasava, Ushirasava, Chandanasava, Kanakasava, Sarivadyasava, Pippalyasava, Lohasava, Vasakasava, Kutajarishta, Draksharishta, Raktamitrarka, Dashamularishta, Abhayarishta, Amritarishta, Ashokarishta, Sarasvatarishta,

Arjunarishta, Khadirarishta, Ashwagandha Arishta, Vidangarishta, Takrarishta, Mahadrakshasava, Mritasanjivani sura, Maireya, Varuni, Sidhu, Kanji, Dhanyamla, Madhu Shukta, Pindasava.

ix. Anya Kalpa : Phala varti, Chandrodaya varti, Arka lavana, Narikela lavana, Triphala masi, Apamarga kshara, Snuhi kshara, Ksharasutra, Atasi upanaha, Sarjarasa malahara, Gandhaka malahara, Sindhuradi Malahara, Shatadhouta Ghrita, Sahasra Dhouta Ghrita, Siktha taila, Dashanga lepa, Doshaghna lepa, Bhallataka taila patana, Jyotishmati Taila, Bakuchi Taila, Dashanga dhupa, Arshoghna dhupa, Nishadi Netra bindu, Madhutailika Basti, Piccha Basti, Yapana Basti.

PAPER – IV Pharmacology and Pharmacy Management

PART - A

- 1. General Pharmacology:**
 - a)** Principles of Pharmacology, Pharmacodynamics & Pharmacokinetics: Absorption, distribution, Metabolism & excretion, mechanism of action, dose determination and dose response, structure activity relationship.
 - b)** Routes of drug administration
 - c)** Factors modifying drug effect, Bioavailability and Bioequivalence, drug interactions, adverse drug reaction and drug toxicity
 - d)** Preclinical evaluation: experimental pharmacology [bioassay, in vitro, in vivo, cell line studies] animal ethics.
- 2. Clinical pharmacology:** Evaluation of New Chemical Entity – phases and methods of clinical research. Ethics involved in human research.
- 3. Elemental constituents of human body and its physiological importance.** Deficiencies and excess of various elements (micro-nutrients).
- 4. Toxicity of heavy metals and chelation therapy.**
- 5. Knowledge of toxicity and pharmacological activities of herbo-mineral compounds.**
- 6. Detailed Knowledge of Pharmacovigilance – National and International Scenario.** Pharmacovigilance of Ayurvedic Drugs

Part B

- 1. Scope and evolution of pharmacy. Information resources in pharmacy and pharmaceutical Science.**
- 2. Pharmaceutical dosage form design (Pre-formulation)**
- 3. Packaging materials and Labeling**
- 4. Management of pharmacy, store and inventory management, personnel management, Good Manufacturing Practices related to Ayurvedic drug industry.**
- 5. Pharmaceutical Marketing, product release and withdrawals.**
- 6. Hospital, Dispensing and Community pharmacy.**
- 7. Patenting and Intellectual Property Rights.**
- 8. Laws Governing Ayurvedic drugs**

- i. Relevant regulatory provisions of Ayurvedic drugs in Drug and Cosmetics Act - 1940 and Rules - 1945
- ii. Laws pertaining to Drugs and Magic remedies (Objectionable Advertisement) Act - 1954.
- iii. Prevention of Food Adulteration (PFA) act.
- iv. Food Standards and Safety Act - 2006
- v. Laws pertaining to Narcotics
- vi. Factory and Pharmacy Acts
- vii. Consumer Protection Act -1986

9. Regulatory Affairs related to International Trade and Practices of Ayurvedic Drugs

10. Introduction to Ayurvedic Pharmacopoeia of India, Ayurvedic Formulary of India.

11. Introduction to Indian Pharmacopoeia, British and United States Pharmacopoeia, Pharamcoepial Codex

12. Introduction to Traditional Knowledge Digital Library

Practicals:-

Minimum 150 Practical are to be performed covering all the dosage forms.

Educational Visits to minimum Five (5) GMP approved Ayurvedic Pharmacies.

Ten days posting in R & D / Production unit in GMP certified Ayurvedic Pharmacy.

Minimum attendance in three National Conferences within three academic years. Minimum 10 clinical cases using different dosage forms are to be studied and recorded for efficacy and ADRs (if any).

Minimum one research paper on the core contributory work of dissertation published or accepted in peer reviewed, indexed journal.

Examinee has to submit supporting documents in relation to above mentioned academic activities at the time of Practical examination.

Pattern of Practical Examination

Total Marks : 100

Duration of the practical: 2 days

1. Identification of the specimen:

10 Marks

2. Drug Processing

30 Marks

(10+10+5+5)

i) Major Practicals: 2 (1 Rasashastra and 1 Bhaishajya Kalpana)

ii) Minor Practicals: 2 (1 Rasashastra and 1 Bhaishajya Kalpana)

3. Drug testing and Analysis

10 Marks (5+5)

- i) Rasaushadhi – 1
- ii) Kashthaushadhi – 1

4. Power Point Presentation on dissertation work: 15 Minutes 10 Marks

6. A Demo Lecture on any subject topic: 10 Minutes. 10 Marks

7. Documentation 15 Marks

- i. Journals (Practical Records) of minimum 75 practicals (25 each from Rasa Shastra, Bhaishajya Kalpana and Analytical part).
- ii. Reports of the Visits
- iii. Case Records

8. Viva Voce examination

15 Marks

Reference Books:-

Rasahridaya Tantra

Rasarnava

Rasaratna Samuccahaya

Ayurved Prakasha

Rasendrachudamani

Rasendra Chintamani

Rasatarangini

Rasaparaksha Sudhakar

Rasamrita

Rasa Chandanshu : CCRAS Publication

Sharangadhara Samhita

Sharangadhara Darpan (BP Pandey)

Bhavaprakasha

Yoga Ratnakara

Bhaishajya Ratnavali

Siddha Bhaishajya Manimala

Ayurvediya Aushadhikarana – Puranik and Dhamanakar Bharat Bhaishajya
Ratnakara

Rasayoga Sagara

Siddha Bhaishajya Manimala

Siddha Yoga Sangraha – Yadavaji Trikamji Acharya

Sahasrayoga

Vaidyaka Paribhasha Pradeepa

Dravyaguna Vijnan Part - 1 and 2 - Yadavji Trikamji Chakradatta -
Ratnaprabha,

Relevant Parts from Charaka Samhita, Sushruta Samhita, Kashyapa
Samhita, Ashtanga Sangraha, Ashtanga Hridaya,

Remington: Science and Practice of Pharmacy

Theory and Practice of Industrial Pharmacy – Leon Lachman *et al* Clinical
Pharmacology, KD Tripathi

Clinical Pharmacology, Lawrence Benette

Drug Discovery and Evaluation (Pharmacological assays) HG Vogel
Pharmacological Basis of therapeutics – Goodman and Gilman Data Base of
Medicinal Plants of CCRAS

Quality and Standards of Medicinal Plants – ICMR publication

Quality Control of Ayurvedic Drugs – PLIM, Gaziabad

Ayurvedic Pharmacopeia of India

Ayurvedic Formulary of India

Indian Pharmacopeia

British Pharmacopeia

United States Pharmacopeia

Pharmacopeia Codex

Current Good Manufacturing Practices

Drugs and Cosmetic Act 1940 and Rules 1945 with latest amendments

Drugs and Magic remedies (Objectionable advertisement) Act-1954

Prevention of Food Adulteration (PFA) act

Laws pertaining to Narcotics

Factory and Pharmacy Acts

Consumer Protection Act -1986

Brief information on the peer reviewed journals, official websites and other official search engines along with their links (related with the subject) Rutleys Elements of Mineralogy

Bhasma Vigyaniam

Kupipakva Vigyaniam

Anupana Manjari

**Bharati Vidyapeeth
Deemed to be University, Pune
Faculty of Ayurved**

Programme- MD Ayurved in Rasashashtra evam Bhaishjya Kalpana

Addition in the syllabus of Rasashashtra evam Bhaishjya Kalpana

1. Current and emerging trend in Ayurvedic pharmaceuticals Cosmetics-Formulation, Regulatory Provisions , Plan for Cosmetics pharmacy, Standard operating processes for manufacturing of formulation , Quality Control of Raw Materials and Finished products, In Vivo / In vitro analysis
2. Single drug (Herbal & Mineral) Single drug its variety of formulations and their different indications• Chemical/phytochemical composition
3. Pharmacodynamics and pharmacokinetics of different formulation
4. Ayurvedic Perspective of Nutraceuticals non Indian nutraceuticals and their uses
5. Advantages and disadvantages of aushadhi prayoga marga and probable mode of action after administration of various dosage forms
6. Rational prescription along with safe dispensing of Ayurvedic formulations.
7. Traditional & Local health Practices



**BHARATI VIDYAPEETH
DEEMED TO BE UNIVERSITY
PUNE**

**FACULTY OF AYURVED
MD- Rasashashtra Evam Bhaishjya Kalpana
Old Syllabus**



BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY) PUNE, INDIA.

FACULTY OF AYURVED

Pune- Satara Road, Pune-411043.

Rasashashtra Evam Bhaishjya Kalpana

Accredited with 'A+' Grade (2017) by NAAC.

'A' Grade University status by MHRD, Govt. of India

Accredited (2004) & Reaccredited (2011) with 'A' Grade by NAAC.

Post- Graduate (M.D./M.S./Diploma in Ayurved)

Syllabus/ Curriculum

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Preface

Ayurveda is accepted worldwide as one of the oldest traditional systems of medicine. The ancient insight in this traditional system of medicine is still not profoundly discovered. Ayurveda signifies as "the life-science " where ayur means "life" and veda means "science" in Sanskrit. Ayurveda is the upaveda i.e. "auxiliary knowledge of Atharvaveda in Vedic tradition with its prime origin from Atharva-Veda and a supplement of the Rig-Veda. Lord Dhanvantari is worshipped as the God of Ayurveda. The goal of this traditional medicine system is to prevent illness, disease cure and preserve life. Being originated in India Ayurveda extends its wings in various parts of the world. In ancient days Ayurveda was taught in Gurukula system, which is now evolved in to post graduate courses from Institutions.

The Indian Medical Council was set up in 1971 by the Indian government to establish maintenance of standards for undergraduate and postgraduate education. It establishes suitable qualifications in Indian medicine and recognizes various forms of traditional practice including Ayurveda.

Ayurvedic practitioners also work in rural areas, providing health care to the million people in India alone. They therefore represent a major force for primary health care, and their training and placement are important to the government of India. Being a scientific medicine, Ayurveda has both preventive and curative aspects. The preventive component emphasizes the need for a strict code of personal and social hygiene, the details of which depend upon individual, climatic, and environmental needs.

The Bachelor of Ayurvedic Medicine and Surgery, MD/MS in various discipline of

Ayurveda started with the intention to encourage integrated teaching and de-emphasize compartmentalization of disciplines so as to achieve horizontal and vertical integration in different phases which helps to support National Health Services.

Looking into the health services provided to the public, understanding the need of practitioners of Ayurvedic system of medicine, as per the guidelines of apex body National Council of Indian system of Medicine (formerly CCIM) and suggestions provided by the faculty of various Specialties, stake holders and strategy of University this governance is framed

based on following aims and objectives -

Aims and objectives-

The aims of the post-graduate degree courses shall be to provide orientation of specialties and super-specialties of Ayurveda, and to produce experts and specialists who can be competent and efficient teachers, physicians, surgeons, gynaecologists and obstetricians (Stri Roga and Prasuti Tantragraha), pharmaceutical experts, researchers and profound scholars in various fields of specialization of Ayurveda.

Faculty of Ayurved, Bharati Vidyapeeth (Deemed to be University), Pune

Vision-

To be a world class university for social transformation through dynamic education

Mission-

- To ensure the good health and longevity of mankind.
- To carve a niche for our college in the world of Ayurved education
- To provide
 - Borderless access to Ayurved education
 - Quality Ayurved education
- To promote
 - Quality research in diverse areas of health care system.
 - Extensive use of ICT for teaching, learning and governance.
 - To develop national and international networks with industry and other academic and research institutions.

Program Outcomes For Post Graduate Courses in Ayurved-

- PG degree holder should be expert and specialist of his/ her branch who can be competent and efficient teacher, physician, surgeon, gynaecologist and obstetrician (Stri Roga and Prasuti Tantragya), pharmaceutical expert, researcher and profound scholar in various fields of specialization of Ayurved.
- Should be having knowledge of Concept of Good clinical practices in Ayurved and modern medicine

Course specific outcomes

M. S – Ayurved Dhanvantari in

1. PRASUTI TANTRA & STREEROGA [OBSTETRICS AND GYNECOLOGY]

- To be able to manage normal and complicated Pre-natal, Intra partum and Post natal cases by integrative approach
- To be able to manage all types of gynecological disorders at every epoch of womanhood.
- To be able to perform all kinds of Ayurvedic procedures and surgical procedures related to Stree roga and Prasutitantra
- To have knowledge of medico legal aspects of obstetrics and gynecology.

M. S – Ayurved Dhanvantari in

2. SHALAKYA TANTRA [NETRA, SHIRO, NASA, KARNA, KANTHA, MUKHA]

- To be able to manage all cases of E.N.T. and ophthalmology by integrative approach.
- To be able to perform all kinds of Ayurvedic procedures and surgical procedures related to Shalakyatantra
- To have knowledge of medico legal aspects of Shalakyatantra

M. S – Ayurved Dhanvantari in

3. SHALYA TANTRA [GENERAL SURGERY]

- To be able to manage all surgical cases by integrative approach
- To be able to perform all kinds of Ayurvedic procedures and general surgical procedures
- To have adequate knowledge of Anushashtra – Ksharkarma and prayoga, Agnikarma [thermo therapy], Raktamokshan [bloodletting] or Asthisandhi evam marma vigyan [orthopedic] or Sangyahan [Anesthesiology] or Mootraroga [Urology]
- To have knowledge of medico legal aspects of Shalyatantra

M.D.- Ayurved Vachaspati in

1. AYURVED SAMHITA & SIDDHANT

- to have profound knowledge of Charak Samhita, Sushrut Samhita & AshtangHridayam, Ayurvediya and Darshanika Siddhanta with commentaries
- to be able to interpret philosophical principles incorporated in Charak Samhita, Sushrut Samhita, Ashtanga Hridaya, Ashtang Samgraha.
- To able to understand Practical applicability of principles of samhita and a competent Ayurved physician
- Competency in fundamental research

M.D.- Ayurved Vachaspati in

2. RACHANA SHAARIRA

- Should have thorough knowledge and competency in Ayurved Sharira and Modern anatomy
- Having extensive knowledge and skill of dissecting human dead bodies and its demonstration.

M.D.- Ayurved Vachaspati in

3. KRIYA SHARIR

- Having profound knowledge of Ayurved Kriya Sharir: - - and Contribution of different Ayurveda Samhita in Kriya Sharir
- Ability to determine and demonstrate the Sharir – Manans Prakriti
- Should have knowledge of Modern Physiology and its applied aspects

M.D.- Ayurved Vachaspati in

4. DRAVYAGUNA VIGYAN

- Have a clear understanding of medicinal plants in context to Ayurved and modern Pharmacology and Pharmaceutics
- Have an accurate knowledge of identification, Authentication and standardization of raw and wet plant drugs.
- Ability of cultivation and plantation of medicinal plants
- Knowledge about Pharmacovigilance
- Ability to conduct the pre clinical and clinical trials of medicinal plants

M.D.- Ayurved Vachaspati in

5. RASASHASTRA EVAM BHAISHJYA KALPNA

- Have an accurate knowledge of identification, Authentication and standardization of minerals and metals along with plant drugs
- Possess detailed knowledge of manufacturing practices of various dosage forms of

Ayurved formulations as per GMP

- Ability to establish, run and manage pharmacy as per GMP and FDA guidelines
- Having knowledge of Drug and cosmetics related acts
- Ability to conduct the pre clinical and clinical trials on minerals and metals

M.D.- Ayurved Vachaspati in

6. AGADA TANTRA EVUM VIDHIVAIDYAKA

- To be able to understand and interpret Ayurvedic and Contemporary Toxicology
- Having knowledge of Pharmacodynamics of different formulations used in Agadatantra and Clinical & Experimental toxicology
- Ability of Ayurvedic & Contemporary Management Of Poisoning
- Should have profound knowledge of Forensic Medicine and Medical Jurisprudence
- Ability to diagnose and manage substance abuse [De- addiction]
- Have knowledge of Pharmacovigilance, community health problems due to poisons & pollution, Drug interactions & incompatibility etc.

M.D.- Ayurved Vachaspati in

7. SWASTHAVRITTA

- Having knowledge of Concept of holistic health and Principles of dietetics according to Ayurveda
- Understanding the Concept of community health, prevention, Stages of intervention according to Ayurved Modern medicine
- Should have knowledge of Ayurved and Modern Concept of Epidemiology [Janapadodhwamsa]
- Possess knowledge of Therapeutic effect of Yogic practices and ability to demonstrate various yogasanas in various diseases
- Understanding the role of Ayurved for Immunization, Occupational Health, Geriatrics, Life Style disorders (Non Communicable diseases)

M.D.- Ayurved Vachaspati in

8. ROGA NIDANA

- To understand the Concept and applied aspects of fundamental principles of Rognidan
- To have profound Knowledge of classical Samprapti of all diseases with interpretation of Nidana Panchaka including Upadrava, Arishta and Sadhyasadhyata and Chikitsa Sutra.
- Ability of Ayurvedic interpretation of commonly occurring diseases in contemporary medicine, all relevant findings of modern clinical examinations and various Laboratory and other Diagnostic reports

- Ability of establishment and management of standard clinical laboratory set up
- Have knowledge about Upasargajanya Vyadhi (Communicable diseases)

M.D.- Ayurved Vachaspati in

9. Panchakarma

- To have thorough knowledge of Kayachikitsa, basic principles of Shodhana (BioPurification methods) and Raktamokshana, Physiotherapy & Disease-wise Panchakarma
- To be able to perform poorva, Pradhan & Pashchat karma of Panchakarma procedures [five Purification therapies] of Ayurveda and manage its complications [Updrava].
- To be able to prepare all the necessary bhaishjya kalpana for various panchakarma procedures

M.D.- Ayurved Vachaspati in

10. Kayachikitsa

- To have thorough knowledge of Fundamentals of Kayachikitsa
BVDUCOA_ Programme outcomes Page 7
- To be able to perform Rogi-Roga Pariksha in Ayurved and Modern perspectives with the help of modern diagnostic parameters.
- To be able to perform samanya and vishesh roga chikitsa including application of advances in Rasayana and Vajikarana therapies and emerging trends in Panchakarma in various disease management
- To have knowledge of Critical care medicine, Management of medical emergencies, ICU services, Field medical services
- To be able to participate in National Health Programmes and recognize prospective role of Ayurveda services and therapeutics in them.

M.D.- Ayurved Vachaspati in

11. KAUMARBHRITYA-BALA ROGA

- Ability to interpret Ayurvedic genetics with Pathogenesis of Modern genetics and management of genetic disorders
- To have thorough knowledge of Neonatal Care and management of all types of neonatal diseases
- To diagnose and manage the Paediatric Disorders
- Ability to develop and manage paediatric ward with Fundamentals of Hospital management

Eligibility

Passing marks for eligibility in admission to ASU&H- PG courses should be as per the ASU&H- PG regulations and should be followed strictly., -

- A person possessing the degree of Ayurvedacharya (Bachelor of Ayurveda Medicine and Surgery) or provisional degree certificate recognized as per the provisions of IMCC 1970/NCISM 2020 act and possess permanent or provisional registration certificate issued by the CCIM/NCISM/state board and must have completed a satisfactorily one year compulsory rotating internship as per the NCISM notification.
- In order to be eligible for admission to post graduate courses it shall be necessary for a candidate to obtain minimum of marks at 50th percentile in the All India AYUSH Post Graduate Entrance Test (AIAPGET) .
- Candidates belonging to the scheduled castes, Scheduled Tribes and other Backward Classes the minimum marks shall be at 40th percentile.

Medium of instruction

The medium of instruction for the programme shall be Sanskrit or Hindi or English with use of Ayurvedic technical terms.

Duration of the Course Study

Total Duration of Course – 3 Years from the Commencement of classes. The maximum duration for completion of the course shall not exceed beyond the period of six years from the date of admission to the course.

Curriculum - As approved by Bharati Vidyapeeth [Deemed to be University], Pune is in line with the directives of the Central Council for Indian Medicine.

Attendance and Progress

The students shall have to attend a minimum of seventy-five per cent. of total lectures, practical's and clinical tutorials or classes to become eligible for appearing in the examination. A Web based centralized biometric attendance system shall be required for the attendance of post-graduate students and manual attendance at department level in which student is pursuing the post-graduate course.

The student shall have to attend the hospital and perform other duties as may be assigned to him during study. The student of clinical subject shall have to do resident duties in their respective departments and student of non-clinical subject shall have duties in their respective departments like Pharmacy or Herbal Garden or Laboratory during study. The student shall attend special lectures, demonstrations, seminars, study tours and such other activities as may be arranged by the teaching departments.

Subjects taught, Number of lectures/ practical and demonstrations for various subjects [MD/MS]

❖ **Specialties in which post-graduate degree is allowed are as under: -**

Sr. No.	Name of speciality	Nearest terminology of modern subject	Department in which postgraduate degree can be conducted
Pre-clinical speciality			
1	Ayurveda Samhita evam Siddhant	Ayurveda Samhita and basic principles of Ayurveda	Samhita and basic principles of Ayurveda
2	Rachana Sharira	Anatomy	Rachana Sharira
3	Kriya Sharira	Physiology	Kriya Sharira
Para-clinical speciality			
4	Dravyaguna Vigyana	Materia Medica and Pharmacology	Dravyaguna
5	Rasa Shastra evam Bhaishajya Kalpana	Ayurveda Pharmaceuticals	Rasa Shastra evam Bhaishajya Kalpana
6	Roga Nidana evam Vikriti Vigyana	Diagnostic Procedure and Pathology	Roga Nidana evam Vikriti Vigyana
Clinical speciality			
7	Prasuti evam Stri Roga	Obstetrics and Gynecology	Prasuti evam Stri Roga
8	Kaumarabhritya –Bala Roga	Pediatrics	Kaumarabhritya– Bala Roga
9	Swasthavritta	Preventive Social Medicine	Swasthavritta and Yoga
10	Kayachikitsa	Medicine	Kayachikitsa
11	Shalya	Surgery	Shalya Tantra
12	Shalakya	Diseases of Eye, Ear, Nose, Throat Head, Neck, Oral and Dentistry	Shalakya Tantra
13	Panchakarma	Panchakarma	Panchakarma
14	Agada Tantra	Toxicology and Forensic Medicine	Agada Tantra.

❖ **Nomenclature of post-graduate degree. -**

The nomenclature of post-graduate degree in respective specialties shall be as under: -

Sl.No.	Nomenclature of specialty or degree	Abbreviation
Pre-clinical specialty		
1	Ayurveda Vachaspati – Ayurveda Samhita Evum Siddhant	M.D. (Ayurveda)- Compendium and Basic Principles
2	Ayurveda Vachaspati – Rachana Sharira	M.D. (Ayurveda) - Anatomy
3	Ayurveda Vachaspati – Kriya Sharira	M.D. (Ayurveda) - Physiology
Para-clinical specialty		
4	Ayurveda Vachaspati – Dravyaguna Vigyana	M.D. (Ayurveda) - Materia Medica and Pharmacology
5	Ayurveda Vachaspati – Rasa Shastra evam Bhaishajya Kalpana	M.D. (Ayurveda) - Pharmaceuticals
6	Ayurveda Vachaspati – Roga Nidana evam Vikriti Vigyana	M.D. (Ayurveda)- Diagnostic procedure and Pathology
Clinical specialty		
7	Ayurveda Dhanvantari – Prasuti evam Stri Roga	M.S. (Ayurveda)- Obstetrics and Gynecology
8	Ayurveda Vachaspati – Kaumarabhritya –Bala Roga	M.D. (Ayurveda)- Pediatrics
9	Ayurveda Vachaspati – Swasthavritta	M.D. (Ayurveda)- Social and Preventive Medicine
10	Ayurveda Vachaspati – Kayachikitsa	M.D. (Ayurveda)- Medicine
11	Ayurveda Dhanvantari – Shalya	M.S. (Ayurveda)- Surgery
12	Ayurveda Dhanvantari – Shalakyia	M.S. (Ayurveda)- Diseases of Eye, Ear, Nose, Throat Head, Neck, Oral and Dentistry
13	Ayurveda Vachaspati – Panchakarma	M.D. (Ayurveda)- Panchakarma
14	Ayurveda Vachaspati – Agada Tantra	M.D. (Ayurveda)- Toxicology and Forensic Medicine

Synopsis and Dissertation

Central Scientific Advisory Post Graduate Committee appointed by Central Council of Indian Medicine shall suggest the areas of Research and topics and the same shall be followed by University Committee while approving the Dissertation title.

The title of the dissertation along with the synopsis, with approval of the Ethics Committee constituted by the institute shall be submitted to the University within a period of six months from the date of admission to the post-graduate course.

If the student fails to submit the title of dissertation and synopsis within specified period, his terms for final post-graduate course shall be extended for six months or more in accordance with the time of submission of the synopsis to the University.

- **Synopsis**

The synopsis of the proposed scheme of work shall indicate the expertise and action plan of work of the student relating to the proposed theme of work, the name of the department and the name and designation of the guide or supervisor and co-guide (if any).

The University shall approve the synopsis not later than three months after submission of the synopsis.

A Board of Research Studies shall be constituted by the University to approve the title.

The University shall display the approved synopsis of dissertation on their website.

- **Dissertation**

Once the title for dissertation is approved by the Board of Research Studies of the University, the student shall not be allowed to change the title of the proposed theme of work without permission of the University.

No student shall be allowed to submit the dissertation before six months of completion of course and the student shall continue his regular study in the institution after submission of dissertation to complete three years.

The dissertation shall consist of not less than forty thousand words.

The dissertation shall contain, at the end, a summary of not more than one thousand and five hundred words and the conclusion not exceeding one thousand words.

Five copies of the bound dissertation along with a certificate from the supervisor or guide shall reach the office of the Registrar of the University four months before the final examination.

The student shall be permitted to appear in the final examination of post-graduate degree course only after approval of the dissertation by the examiners.

Scheme of Examination

The post-graduate degree course shall have two university examinations in the following manner, namely: -

1. The preliminary examination -
2. The final examination –

1.The preliminary examination – Conducted at the end of one academic year after admission.

The subjects/ Number of Papers for preliminary examination namely: -

Paper I- Research Methodology and Bio or Medical Statistics;

Paper II- Applied aspects regarding concerned subjects.

Rules-

The student shall have to undergo training in the department concerned and shall maintain month-wise record of the work done during the last two years of study in the specialty opted by him as under:-

- (a) Study of literature related to specialty,
- (b) Regular clinical training in the hospital for student of clinical subject,
- (c) Practical training of research work carried out in the department, for student of pre-clinical and paraclinical subject,
- (d) Participation in various seminars, symposia and discussions; and (e) progress of the work done on the topic of dissertation.

The assessment of the work done by the students of first year post-graduate course during the first year will be done before the preliminary examination.

Examination shall ordinarily be held in the month of June or July and November or December every year. For being declared successful in the examination, student shall have to pass all the subjects separately in preliminary examination. The student shall be required to obtain a minimum of fifty per cent and marks in practical and theory subjects separately to be announced as a pass. If a student fails in the preliminary examination, he shall have to pass before appearing in the final examination.

2. The final examination -Conducted on completion of three academic years after the admission to postgraduate course.

The final examination shall include dissertation, written papers and clinical or practical and oral examination.

Number of Papers -There shall be four theory papers in each specialty and one practical or clinical and viva-voce examination in the concerned specialty or group of sub-specialties selected by the student for special study.

The student shall publish or get accepted minimum one research paper on his research work in one journal and one paper presentation in regional level seminar.

The preliminary examination and final examination shall be held in written, practical, or clinical and oral examination. If the student fails in theory or practical in the final examination, he can appear in the subsequent examination without requiring submitting a fresh dissertation. The subsequent examination for failed candidates shall be conducted at every six-month interval; and the post-graduate degree shall be conferred after the dissertation is accepted and the student passes the final examination.

M.D.-AYURVEDA

PRELIMINARY PAPER-I
RESEARCH METHODOLOGY AND MEDICAL STATISTICS

PART-A
RESEARCH METHODOLOGY

- 1 Introduction to Research**
 - A. Definition of the term research
 - B. Definition of the term anusandhan
 - C. Need of research in the field of Ayurveda

- 2 General guidelines and steps in the research process**
 - A. Selection of the research problem
 - B. Literature review: different methods (including computer database) with their advantages and limitations
 - C. Defining research problem and formulation of hypothesis
 - D. Defining general and specific objectives
 - E. Research design: observational and interventional, descriptive and analytical, preclinical and clinical, qualitative and quantitative
 - F. Sample design
 - G. Collection of the data
 - H. Analysis of data.
 - I. Generalization and interpretation, evaluation and assessment of hypothesis.
 - J. Ethical aspects related to human and animal experimentation.
 - K. Information about Institutional Ethics Committee (IEC) and Animal Ethics Committee (AEC) and their functions. Procedure to obtain clearance from respective committees, including filling up of the consent forms and information sheets and publication ethics.

- 3 Preparation of research proposals in different disciplines for submission to funding agencies taking EMR-AYUSH scheme as a model.**

- 4. Scientific writing and publication skills.**
 - a. Familiarization with publication guidelines- Journal specific and CONSORT guidelines.
 - b. Different types of referencing and bibliography.
 - c. Thesis/Dissertation: contents and structure
 - d. Research articles structuring: Introduction, Methods, Results and Discussions (IMRAD)

- 5 Classical Methods of Research. Tadvidya sambhasha, vadmarga and tantrayukti**

Concept of Pratyakshadi Pramana Pariksha, their types and application for Research in Ayurveda.

Dravya-, Guna-, Karma-Parikshana Paddhati
Aushadhi-yog Parikshana Paddhati
Swastha, Atura Pariksha Paddhati
Dashvidha Parikshya Bhava
Tadvidya sambhasha, vadmarga and tantrayukti

6 Comparison between methods of research in Ayurveda (Pratigya, Hetu, Udaharana, Upanaya, Nigaman) and contemporary methods in health sciences.

7. Different fields of Research in Ayurveda

- a. Fundamental research on concepts of Ayurveda
- b. Panchamahabhuta and tridosha.
- c. Concepts of rasa, guna, virya, vipak, prabhav and karma
- d. Concept of prakriti-saradi bhava, ojas, srotas, agni, aam and koshta.

8. Literary Research-

Introduction to manuscriptology: Definition and scope. Collection, conservation, cataloguing.

Data mining techniques, searching methods for new literature; search of new concepts in the available literature. Methods for searching internal and external evidences about authors, concepts and development of particular body of knowledge.

9. Drug Research (Laboratory-based)- Basic knowledge of the following:

Drug sources: plant, animal and mineral. Methods of drug identification.

Quality control and standardization aspects: Basic knowledge of Pharmacopoeial standards and parameters set by Ayurvedic Pharmacopoeia of India.

Information on WHO guidelines for standardization of herbal preparations. Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP).

10. Safety aspects: Protocols for assessing acute, sub-acute and chronic toxicity studies. Familiarization with AYUSH guidelines (Rule 170), CDCSO and OECD guidelines.

11. Introduction to latest Trends in Drug Discovery and Drug Development

- Brief information on the traditional drug discovery process
- Brief information on the latest trends in the Drug Discovery process through employment of rational approach techniques; anti-sense approach, use of micro and macro-arrays, cell culture based assays, use of concepts of systems biology and network physiology
- Brief introduction to the process of Drug development

12. Clinical research:

Introduction to Clinical Research Methodology identifying the priority areas of Ayurveda

Basic knowledge of the following:-

Observational and Interventional studies

Descriptive & Analytical studies

Longitudinal & Cross sectional studies

Prospective & Retrospectives studies

Cohort studies

Randomized Controlled Trials (RCT) & their types
Single-case design, case control studies, ethnographic studies, black box design, cross-over design, factorial design.

Errors and bias in research.

New concepts in clinical trial- Adaptive clinical trials/ Good clinical practices (GCP)

Phases of Clinical studies: 0,1,2,3, and 4.

Survey studies -

Methodology, types, utility and analysis of Qualitative Research methods. Concepts of in-depth interview and Focus Group

Discussion.

13. Pharmacovigilance for ASU drugs. Need, scope and aims & objectives. National Pharmacovigilance Programme for ASU drugs.

14. Introduction to bioinformatics, scope of bioinformatics, role of computers in biology. Introduction to Database- Pub med, Medlar and Scopus. Accession of databases.

15. Intellectual Property Rights- Different aspect and steps in patenting. Information on Traditional Knowledge Digital Library (TKDL).

PART-B

40 marks

MEDICAL STATISTICS

Teaching hours: 80

1 **Definition of Statistics :** Concepts, relevance and general applications of Biostatistics in Ayurveda

Collection, classification, presentation, analysis and interpretation of data
(Definition, utility and methods)

2 **Scales of Measurements** - nominal, ordinal, interval and ratio scales.

Types of variables – Continuous, discrete, dependent and independent variables.

Type of series – Simple, Continuous and Discrete

3 **Measures of Central tendency** – Mean, Median and Mode.

4 **Variability:** Types and measures of variability – Range, Quartile deviation, Percentile, Mean deviation and Standard deviation

5 **Probability:** Definitions, types and laws of probability,

6 **Normal distribution:** Concept and Properties, Sampling distribution, Standard Error, Confidence Interval and its application in interpretation of results and normal probability curve.

7 **Fundamentals of testing of hypotheses:**

Null and alternate hypotheses, type I and type 2 errors.

Tests of significance: Parametric and Non-Parametric tests, level of significance and power of the test, 'P' value and its interpretation, statistical significance and clinical significance

8 **Univariate analysis of categorical data:**

Confidence interval of incidence and prevalence, Odds ratio, relative risk and Risk difference, and their confidence intervals

9 Parametric tests:

‘Z’ test, Student’s ‘t’ test: paired and unpaired, ‘F’ test, Analysis of variance(ANOVA) test, repeated measures analysis of variance

10 Non parametric methods:

Chi-square test, Fisher’s exact test, McNemar’s test, Wilcoxon test, Mann-Whitney U test, Kruskal – Wallis with relevant post hoc tests (Dunn)

11 Correlation and regression analysis:

Concept, properties, computation and applications of correlation, Simple linear correlation, Karl Pearson’s correlation co-efficient, Spearman’s rank correlation.
Regression- simple and multiple.

12 Sampling and Sample size computation for Ayurvedic research:

Population and sample. Advantages of sampling, Random (Probability) and non random (Non- probability) sampling. Merits of random sampling. Random sampling methods- simple random, stratified, systematic, cluster and multiphase sampling. Concept, logic and requirement of sample size computation, computation of sample size for comparing two means, two proportions, estimating mean and proportions.

13 Vital statistics and Demography:

computation and applications - Rate, Ratio, Proportion, Mortality and fertility rates, Attack rate and hospital-related statistics

14 Familiarization with the use of Statistical software like SPSS/Graph Pad

PRACTICAL

100 marks

I. RESEARCH METHODOLOGY

Teaching hours 120

PRACTICAL NAME

1 Pharmaceutical Chemistry

Familiarization and demonstration of common lab instruments for carrying out analysis as per API

2 Awareness of Chromatographic Techniques

Demonstration or Video clips of following:

- Thin-layer chromatography (TLC).
- Column chromatography (CC).
- Flash chromatography (FC)
- High-performance thin-layer chromatography (HPTLC)
- High Performance (Pressure) Liquid Chromatography (HPLC)
- Gas Chromatography (GC, GLC)

4 Pharmacognosy

Familiarization and Demonstration of different techniques related to:-Drug administration techniques- oral and parenteral.

Blood collection by orbital plexuses puncturing.

Techniques of anesthesia and euthanasia.

Information about different types of laboratory animals used in experimental research
Drug identification as per API including organoleptic evaluation

5 Pharmacology and toxicology

Familiarization and demonstration of techniques related to pharmacology and toxicology

6 Biochemistry (Clinical)

Familiarization and demonstration of techniques related to basic instruments used in a clinical biochemistry laboratory – semi and fully automated clinical analyzers, electrolyte analyzer, ELISA-techniques, nephelometry.

Demonstration of blood sugar estimation, lipid profiles, kidney function test, liver function test. HbA1, cystatin and microalbumin estimation by nephelometry or other suitable techniques. Interpretation of the results obtained in the light of the data on normal values.

7 Clinical Pathology

Familiarization and demonstration of techniques related to basic and advanced instruments used in a basic clinical

pathology lab. Auto cell counter, urine analyzer, ESR, microscopic examination of urine.

8 Imaging Sciences

Familiarization and demonstration of techniques related to the imaging techniques. Video film demonstration of CT-Scan, MRI-scan and PET-scan.

9 Clinical protocol development

II. MEDICAL STATISTICS

Practical hours:20

Statistical exercise of examples from Topic number 4, 5, 8-12, 14, 15. Records to be prepared.

Distribution of marks (practical):

1. Instrumental spotting test– 20 marks
2. Clinical protocol writing exercise on a given problem– 20 marks
3. Records:Research methodology -10 Mark
4. Medical statistics -10 marks
5. Viva- Voce -40 Marks

REFERENCE BOOKS:-

Pharmacognosy:

1. Aushotosh Kar “Pharmacognosy & Pharmacobiotechnology” New Age International Publisher. Latest Edition. New Delhi.
2. Drug Survey by Mayaram Uniyal
3. Fahn A (1981). Plant Anatomy 3rd Edition Pergamon Press, Oxford
4. Kokate, CK., Purohit, AP, Gokhale, SB (2010). Pharmacognosy. Nirali Prakashan. Pune.
5. Kokate, CK., Khandelwal and Gokhale, SB (1996). Practical Pharmacognosy. Nirali Prakashan. Pune.
6. Trease G E and Evans W C, Pharmacognosy, Bailliere Tindall, Eastbourne, U K.

7. Tyler V C., Brady, L R., and Robers J E., Pharmacognosy, Lea and Febiger, Philadelphia.
8. Tyler VE Jr and Schwarting AE., Experimental Pharmacognosy, Burgess Pub. Co, Minneapolis, Minnesota.
9. Wallis- TE (2011)- reprint. Practical Pharmacognosy (Fourth Edition) Pharma Med Press, Hyderabad.
10. Wallis T E, Analytical Microscopy, J & A Churchill limited, London.
11. Wallis T E., Text Book of Pharmacognosy, J & A Churchill Limited, London.
12. WHO guidelines on good agricultural and collection practices- (GACP) for medicinal plants (2003). World Health Organization- Geneva.
13. WHO monographs on selected medicinal plants (1999)—Vol. 1. 1.Plants, Medicinal 2.Herbs 3.Traditional medicine. ISBN 92 4 154517 8. WHO Geneva.

Pharmaceutical chemistry, quality control and drug standardization:

1. Ayurvedic Pharmacopoeia of India. Part I- volume 1 to 8 and Part II- volume 1 to 3. Ministry of Health and Family Welfare. Controller of Publication. Govt of India. New Delhi.
2. Brain, KR and Turner, TD. (1975). The Practical Evaluation Phytopharmaceuticals. Wright Sciencetechnica, Bristol.
3. Galen Wood Ewing (1985). Instrumental Methods of Chemical Analysis. McGraw-Hill College ;Fifth edition
4. Harborne, JB (1973). Phytochemistry Methods. Chapman and Hall, International Edition, London.
5. HPTLC- Fingerprint atlas of Ayurvedic Single Plant Drugs mentioned in Ayurvedic Pharmacopoeia Vol- III and IV. CENTRAL COUNCIL FOR RESEARCH IN AYURVEDA AND SIDDHA. New Delhi.
6. Kapoor, RC (2010). Some observations on the metal based preparations in Indian System of Medicine. Indian Journal of Traditional Knowledge. 9(3): 562-575
7. Khopkar, S. M. Analytical Chemistry, New Age International Publishers , 3 rd edition
8. Laboratory Guide for- The Analysis of Ayurved and Siddha Formulations – CCRAS, New Delhi.
9. Mahadik KR, Bothara K G. Principles of Chromatography by, 1st edition, Nirali Prakashan.
10. Qadry JS and Qadry S Z., Text book of Inorganic Pharmaceutical and Medicinal Chemistry, B. S.Shah Prakashan, Ahmedabad.
11. Quality Control Methods for Medicinal Plant Material. Reprint (2002). WHO- Geneva.
12. Rangari V.D., Pharmacognosy & Phytochemistry, Vol I, II, Career Publication,
13. Sharma BK. Instrumental Methods of Chemical Analysis by, Goel Publishing House.
14. Srivastav VK and Shrivastav KK. Introduction to Chromatography (Theory and Practice)
15. Stahl E., Thin Layer Chromatography - A Laboratory Handbook, Springer Verlag, Berlin.
16. Sukhdev Swami Handa, Suman Preet Singh Khanuja, Gennaro Longo and Dev Dutt Rakesh (2008).Extraction Technologies for Medicinal and Aromatic Plants -INTERNATIONAL CENTRE FOR SCIENCE AND HIGH TECHNOLOGY- Trieste,

Biochemistry and Laboratory techniques:

1. Asokan P. (2003) Analytical Biochemistry, China publications,
2. Campbell, P.N and A.D .Smith, Biochemistry Illustrated, 4th ed, Churchill Livingstone.
3. David Frifelder. W. H. Freeman. (1982). Physical Biochemistry by; 2 edition

4. David Sultan (2003). Text book of Radiology and Imaging, Vol-1, 7th Edition.
5. Deb, A.C., Fundamentals of Biochemistry, Books and Allied (P) Ltd, 2002.
6. Harold Varley. Practical Clinical Bio-chemistry
7. Kanai L. Mukherjee. Clinical Pathology; Medical Laboratory Technology Vol. I. Tata McGrawHill 1996, New Delhi.
8. Gradwohl, Clinical Laboratory-methods and diagnosis, Vol-I
9. Clinical Biochemistry -Sabitri Sanyal, Clinical Pathology, B.I. Churchill Livingstone (P) Ltd, New Delhi. 2000.
10. Satyanarayanan, U. Essentials of Biochemistry, Books and allied (P) Ltd. 2002
11. Zubay, G.L. Biochemistry, W.M.C. Brown Publishers, New York 1998.
12. Text book of Radiology and Imaging, Vol-1, David Sultan, 7th Edition. 2003.

Research methodology:

1. Alley, Michael. The craft of scientific writing. Englewood Cliffs. N.N. Prentice 1987.
2. Ayurvediya Anusandhan Paddhati – P.V. Sharma
3. Altick and Fenstermaker. (2007). *The Art of Literary Research*. 4th ed. W. W. Norton. Castle, Gregory. *Blackwell Guide to Literary Theory*. Blackwells,
4. Bowling, A. (2002). *Research Methods in Health* (2nd ed). Buckingham: Open University Press.
5. Day R.A. How to write a scientific paper. Cambridge University Press.
6. Cooray P.G. Guide to scientific and technical writing.
7. Deepika Chawla and Neena Sondhi. (2011). *Research Methods- Concepts and cases*. New Delhi: Vikas Publishing House.
8. Greenhalgh, T. (2006) *How to Read a Paper: The Basics of Evidence-Based Medicine*. (3rd ed) Blackwell
9. Kothari- CR (2004). *Research Methodology- Methods and Techniques* (Second Revised Edition). New Age International Publishers- New Delhi.
10. Kumar, R. 2005. *Research Methodology: a Step-by-Step Guide for Beginners, 2nd ed*. Thousand Oaks, CA, London: Sage Publications.
11. Petter Laake, Haakon Breien Benestad and Bjørn Reino Olsen. (2007). *Research Methodology in the Medical and Biological sciences*. Academic Press is an imprint of Elsevier, 84 Theobald's Road, London WC1X 8RR, UK. ISBN: 978-0-12-373874-5
12. Relevant portions of Ayurvedic Samhitas and other texts

Drug research and development:

1. RICK NG, (2009). *DRUGS- from discovery to approval*. John Wiley & Sons, Inc., Hoboken, New Jersey
2. Research guidelines for evaluating the safety and efficacy of herbal medicines. (1993). . WHO- (Regional Office for the Western Pacific – Manila) ISBN 92 9061 110 3 (NLM Classification: WB925).
3. Jagdeesh, Sreekant Murthy, Gupta, YK and Amitabh Prakash Eds. *Biomedical Research (From Ideation to Publication)* (2010). Wolters Kluwer/ Lippincott Williams and Wilkins.
4. WHO Guidelines on Safety Monitoring of herbal medicines in pharmacovigilance systems. (2004). WHO- Geneva. ISBN 92 4 1592214.
5. Natural products isolation. (2006) 2nd ed. / edited by Satyajit D. Sarker, Zahid Latif, Alexander I. Gray. (Methods in biotechnology; 20). Includes bibliographical references and

index. Humana Press Inc. ISBN 1-58829-447-1 (acid-free paper) – ISBN 1-59259-955-9 (eISBN)

6. Gazette Extraordinary Part- II-Section 3 - Sub section (i) December 2008. Govt of India. AYUSH Guidelines on safety studies- Rule 170 of Drugs and Cosmetics Act.
7. OECD (2000) Guidance Document on Acute Oral Toxicity. Environmental Health and Safety Monograph Series on Testing and Assessment No 24.
8. OECD Guideline for the Testing of Chemicals – Repeated Dose 90-day Oral Toxicity Study in Rodents, 408, 1998. <http://browse.oecdbookshop.org/oecd/pdfs/free/9740801e.pdf> (latest version)
9. OECD Series on Principles of Good Laboratory Practice (GLP) and Compliance Monitoring, 1998. http://www.oecd.org/document/63/0,2340,en_2649_34381_2346175_1_1_1_1,00.php
10. ICH Harmonised Tripartite Guideline (2000). Maintenance of the ICH Guideline on Non-clinical Safety Studies for the conduct of Human Clinical Trials for Pharmaceuticals M3 (R1).
11. Ghosh M.N.: Fundamentals of Experimental Pharmacology, *Scientific Book Agency, Bombay.*
12. Jaju B.P.: Pharmacological Practical Exercise Book, *Jaypee Brothers, New Delhi.*
13. Kulkarni S.K.: Hand Book of Experimental Pharmacology, *Vallabh Prakashan, New Delhi*
14. Ravindran R.: X-Pharm (Software), Indian Journal of Pharmacology, *JIPMER, Pondicherry.*

Biotechnology and Bio-informatics:

1. Angela M. Meireles A (2009). Extracting Bioactive compounds for food products. Theory and applications. CRC- Press Taylor and Francis Group.
2. Bergeron BP 2002 Bioinformatics Computing 1st Edition, Prentice Hall
3. Chikhale, N.J. and Virendra Gomase, Bioinformatics- Theory and Practice, Publisher: Himalaya Publication House, India; 1 edition (July, 2007) ISBN-13: 978-81-8318-831-9
4. Lesk, A.M. Introduction to Bioinformatics Oxford 2002.
5. Satyanarayana, U.: Biotechnology, Books and Allied (P) Ltd, Kolkata, 2005
6. Setubal J. C and J. Meidanis, Introduction to Computational Molecular Biology, PWS Publishing Company, 1997.
7. <http://www.iitb.ac.in/~crnts>.
8. <http://www.zygogen.com>.
9. <http://www.dsir.nic.in/reports/tifp/database/metallo.pdf>.
10. www.consort-statement.org
11. www.strobe-statement.org
12. www.icmr.nic.in

Clinical Evaluation:

1. CDSCO, Good Clinical Practices For Clinical Research in India, Schedule Y (Amended Version –2005), <http://cdsco.nic.in/html/GCPI.php>
2. Ethical Guidelines for Biomedical Research on Human subjects. (2000). Indian Council of Medical Research- New Delhi.
3. Gallo P., Chuang-Stein C., Dragalin V., Gaydos B., Krams M., Pinheiro J. Adaptive Designs

in Clinical Drug Development—An Executive Summary of the PhRMA Working Group. *Journal of Biopharmaceutical Statistics*. 16: 275–283; 2006

4. Good Clinical Practices- (2001). Guidelines for Clinical Trial on Pharmaceutical Products in India. Central Drugs Standard Control Organization. Directorate General of Health Services. New Delhi. (<http://WWW.cdsc.nic.in.ich.org>)
5. Gupta, SK Ed. Basic Principles of Clinical Research and Methodology (2007). Jaypee Brothers-new Delhi
6. ICH Harmonised Tripartite Guidelines for Good Clinical Practices.(1997)- Quintiles- Published by Brookwood Medical Publications. Richmond, Surrey. United Kingdom.
7. NCI. *Clinical Trials Education Series*. <http://www.cancer.gov/clinicaltrials/learning/clinical-trials-education-series>, 2001.
8. Petter Laake, Haakon Breien Benestad and Bjørn Reino Olsen. (2007). Research Methodology in the Medical and Biological sciences. Academic Press is an imprint of Elsevier, 84 Theobald's Road, London WC1X 8RR, UK. ISBN: 978-0-12-373874-5
9. William C. Scheffer Introduction to Clinical Researchs

Medical Statistics:

1. Armitage, P. and Berry, G. (1994) Statistical Methods in Medical Research (3rd ed). Blackwell Science.
2. Armitage P, Berry G, Matthews JNS: *Statistical Methods in Medical Research*. Fourth edition. Oxford, Blackwell Science Ltd; 2002
3. Bland, M. (2000) An Introduction to Medical Statistics (3rd ed). Oxford: Oxford University Press.
4. Bradford Hill – Basic Medical Statistics
5. Cambell, M.J. and Machin, D. (1993) Medical Statistics: A Common Sense Approach (2nd ed). Chester: Wiley.
6. Dwivedi S. N., Sundaram K. R and V. Sreenivas (2009). Medical Statistics - Principles & Methods-BI Publications Pvt. Ltd., New Delhi –1.
7. Gupta S.P. - Fundamentals of statistics, Sultan Chand. Delhi.
8. Indrayan. (2008). Basic Methods of Medical Research. AITBS Publishers- India
9. Mahajan B K, Methods in Bio statistics for medical students, 5th Ed. New Delhi, Jaypee Brothers Medical Publishers
10. Mehdi, B and Prakash A. (2010). Biostatistics in Pharmacology. Practical Manual in experimental and clinical pharmacology. 1st Edition. New-Delhi: Jaypee brothers Medical Publishers
11. Rao, NSN and Murthy, NS. (2008) 2nd Edition. Applied statistics in health sciences. Jaypee Brothers Medical Publishers (P) Ltd. Bengaluru, New Delhi.
12. Rick J Turner and Todd A Durham (2008). Introduction to Statistics in Pharmaceutical Clinical trials. Published by the Pharmaceutical Press- An imprint of RPS Publishing, 1 Lambeth High Street, London SE1 7JN, UK
13. Symalan, K. (2006). Statistics in Medicine (First Edition) Trivandrum: Global Education Bureau.
14. Sundar Rao, Jesudian Richard - An Introduction to Biostatistics.
15. Suhas Kumar Shetty- Medical statistics made easy

M.D.-AYURVEDA PRELIMINARY
RASA SHASTRA AND BHAISHAJYA KALPANA
(Iatrochemistry & Pharmaceuticals Science)
PAPER-II

Theory 100 marks

PART-A 50 marks

1. Fundamental principles of Rasa Shastra and Bhaishajya Kalpana, introduction to Rasachikitsa, Ashuddha and Apakwa Bhasma- sevan Doshha and its management, introduction to Aushadha Sevan Kaal and Prayoga Marga (routes of administration).
2. Introduction to basic principles of Aushadha Yoga (formulations).
3. Classification of Rasa Dravya - concept and relevance.
4. Introduction to principles of Aushadha Nirmana, concept of Shodhan, Marana, Jarana, Murcchhana, Sattvapatan and Amritikarana.
5. Concept of Kashaya, Panchavidha Kashaya and other Kalpana.
6. Concept of Rasashala, Rasa Mandapa with introduction to pharmacy in accordance with the Good Manufacturing Practices (GMP).
7. Critical study of Rasa Ratnasamuchchaya, Rasendra Chintamani, Rasa Tarangini, Sharngadhara Samhita, Chakradutta and Bharat Bhaishajya Ratnakara with special reference to Aushadha-Nirmana.

PART-B 50 marks

1. Introduction to methods of analytical, toxicity, experimental and clinical validation of classical and proprietary Ayurvedic formulations.
2. Introduction to new dosage forms.
3. Introduction to advance instruments of analysis like XRD, XRF, SEM-E-Dax, ICP analysis, Chromatography: TLC, gas chromatography, HPTLC, concept of Nanotechnology and its relevance to Aushadha-Nirman.
4. Concept of Pharmacopoeia and Formulary with introduction of 'The Ayurvedic Pharmacopoeia of India' (API) and 'The Ayurvedic Formulary of India' (AFI).
5. Introduction to databases of medicinal plants published by CCRAS, ICMR and others.

PRACTICAL 100 marks

Contents:

1. Shodhan, Marana, Amritikarana of Rasa Dravya (10 practicals)
2. Preparation of different dosage forms (10 forms)
3. Pharmacopoeial standards of raw and prepared drugs (20 practicals)

Raw Materials

1. Minerals and Metals

Mineralogical Identification Mineralogical Identification

1. Physical form - Crystal and Amorphous
2. Hardness on Moh's scale
3. Brittleness test

4. Fracture and Cleavage
5. Streak test
6. Luster

2. Plant Material

Macroscopic and Microscopic examination

- a. Organoleptic testing
- b. Estimation of Foreign materials
- c. Microbial load
- d. Moisture content
- e. Determination of ash value - total, water soluble and acid Insoluble ash
- f. Specific gravity
- g. Solubility- water and alcohol
- h. Extract values- water and alcohol
- i. TLC
- j. Determination of optical density
- k. Refractive index
- l. Aflatoxins
- m. Limit tests for heavy metals
- n. pH estimation

Prepared dosage forms:

1. Solid dosage forms Rasaushadhi

- a) Bhasma and Pishti Pariksha
- b) Determination of Particle size
- c) Limit tests for heavy metals
- d) Determination of moisture content, specific gravity, pH and acid value.

Kasthaushadhi

a. Powders (Churna)

1. Particle size
2. Bulk density
3. Solubility
4. Estimation of Foreign material
5. Microbial load
6. Moisture content
7. Determination of ash value - total, water soluble and acid insoluble ash
8. Solubility - water and alcohol
9. Extract values - water and alcohol
10. TLC
11. Determination of Optical density
12. Refractive Index
13. Aflatoxins
14. Limit tests for Heavy metals

15. pH Value estimation

b. Tablets

1. Uniformity in weight and size
2. Tablet hardness
3. Tablet friability
4. Tablet disintegration
5. Tablet dissolution

c. Semisolid dosage forms

- a. Moisture content
- b. Sugar content
- c. Microbial load

d. Liquids

- pH value
- Specific gravity
- Determination of refractive index
- Acid value
- Viscosity
- Saponification value
- Iodine value

Note:

- All practicals should be performed in accordance with Authoritative Text Books of Schedule-I of D.C.Act-1940.
- All practicals related to Pharmacopoeial Standards should be performed in accordance with Methods Published in Protocol for testing of ASU Medicines and Laboratory Guidelines for the Analysis of Ayurveda & Siddha Formulations published by Deptt. of AYUSH, Government of India.

Distribution of marks (Practical)

- Practical Record Book - 10 Marks
- Practicals related to Preparation of Drugs
 - o Major practical- one - 20 Marks
 - o Minor practical- one - 10 Marks
- Drug analysis
 - o Major practical- one - 20 Marks
 - o Minor practical- one - 10 Marks
- Spotting - 10 Marks
- Viva-voce - 20 Marks

REFERENCE BOOKS:

1. Rasahridaya Tantra
2. Rasarnava

3. Rasaratna Samuccahaya
4. Ayurved Prakasha
5. Rasendrachudamani
6. Rasendra Chintamani
7. Rasatarangini
8. Rasapraksha Sudhakar
9. Rasamrita
10. Rasa Chandanshu : CCRAS Publication
11. Sharangadhara Samhita
12. Sharangadhara Darpan (BP Pandey)
13. Bhavaprakasha
14. Yoga Ratnakara
15. Bhaishajya Ratnavali
16. Siddha Bhaishajya Manimala
17. Bharat Bhaishajya Ratnakara
18. Rasayoga Sagara
19. Siddha Bhaishajya Manimala
20. Sahasrayoga
21. Siddha Yoga Sangraha – Yadavaji Trikamji Acharya
22. Vaidyaka Paribhasha Pradeepa
23. Ayurvediya Aushadhikarana – Puranik and Dhamanakar
24. Dravyaguna Vijnan Part - 1 and 2 - Yadavji Trikamji
25. Chakradatta - Ratnaprabha, Relevant Parts from Charaka Samhita, Sushruta Samhita, Kashyapa Samhita, Ashtanga Sangraha, Ashtanga Hridaya,
26. Remington: Science and Practice of Pharmacy
27. Theory and Practice of Industrial Pharmacy – Leon Lachman et al
28. Clinical Pharmacology, KD Tripathi
29. Clinical Pharmacology, Lawrence Benette
30. Drug Discovery and Evaluation (Pharmacological assays) HG Vogel
31. Pharmacological Basis of therapeutics – Goodman and Gilman
32. Data Base of Medicinal Plants of CCRAS
33. Quality and Standards of Medicinal Plants – ICMR publication
34. Quality Control of Ayurvedic Drugs – PLIM, Gaziabad
35. Ayurvedic Pharmacopeia of India
36. Ayurvedic Formulary of India
37. Indian Pharmacopeia
38. British Pharmacopeia
39. United States Pharmacopeia
40. Pharmacopeia Codex
41. Current Good Manufacturing Practices
42. Drugs and Cosmetic Act 1940 and Rules 1945 with latest amendments
43. Drugs and Magic remedies (Objectionable advertisement) Act-1954
44. Prevention of Food Adulteration (PFA) act
45. Laws pertaining to Narcotics

46. Factory and Pharmacy Acts
 47. Consumer Protection Act -1986
 48. Brief information on the peer reviewed journals, official websites and other official search engines along with their links (related with the subject)
 49. Rutleys Elements of Mineralogy
 50. Bhasma Vigyaniam
 51. Kupipakva Vigyaniam
 52. Anupana Manjari
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M.D.-AYURVEDA FINAL

RASA SHASTRA AND BHAISHAJYA KALPANA

(Iatrochemistry & Pharmaceuticals Science)

RASA SHASTRA AND BHAISHAJYA KALPANA

Paper I Rasa Shastra

Part A

1. History and Chronological evolution of Rasashastra, concept of Raseshwara darshan. Fundamental Principles of Rasashastra Technical terminologies (Paribhasha) used in Rasa shastra.
2. Detailed knowledge of ancient and contemporary Yantropakarana and their accessories used in aushadhikaran and their contemporary modification such as yantras, mushas, putas, Koshtis, bhrashtis, muffle furnaces and other heating appliances, ovens, driers etc. used in manufacturing of Rasaushadhis in small scale and large scale along with their applications.
3. Study of Samskara, Role of agni (Heat), jala and other dravas (water and other processing liquids), kala (Time span), paatra (container) etc. and their significance in aushadhikarana.
4. Concept of Bhavana, study of Mardana and its significance and knowledge of ancient and contemporary grinding techniques.
5. Detailed Knowledge of different procedures of Shodhana, Jarana Murchana and Marana, concept of Puta, definition, types and specifications of different Putas. Significance of different Putas in relation to Bhasmikarana and therapeutic efficacy of dravya under process. Bhasma pariksha vidhi and its significance in relation to contemporary testing procedures. Amritikaran and Lohitikarana.
6. Detailed knowledge of Satva and Druti, Satva shodhan, mrudukaran and Maran of Satva, its significance, in relation to therapeutic efficacy of dravya under process.
7. Concept of Pratinidhi dravya and discussion on controversial drugs.

PART – B

1. Detailed ancient and contemporary knowledge of Parada and its compounds with reference to source, occurrence, physico-chemical characterization, graahya agraahyatva, Parada dosha, Parada gati, Parada shodhan, Study of Ashta sanskara, ashtadasha sanskara etc., Hingulottha Parada. Concept of Parada jaran, moorchana, bandhan, pakshachheda and marana etc. Therapeutic properties and uses of Parada.
2. Detailed ancient & contemporary knowledge with Geochemical / mineralogical / biological identification, source, occurrence, physico-chemical characterization, graahya-agraahyatva, Shodhan Maranadi vidhi and therapeutic properties and uses of dravyas etc. included in Maharasa, Uparasa, Sadharana rasa, Dhatu, Upadhatu,

Ratna, Uparatna, Visha, Upavisha, Sudha varga, Lavana varga, Kshara varga, Sikata varga and other miscellaneous drugs used in Rasashastra.

3. Detailed knowledge of manufacturing, pharmacopeial standards, storage, shelf life, therapeutic efficacy, dose, anupana, vikarashanti upaya and development of technology with Standard Operating Procedures of processing, standardization, quality control of Bhasmas and Pishtis

Bhasma - Abhraka Bhasma, Svarnamakshika Bhasma, Kasis Bhasma, Svarna Bhasma, Rajata Bhasma, Tamra Bhasma, Loha Bhasma, Mandur Bhasma, Naga Bhasma, Vanga Bhasma, Yashad Bhasma, Trivanga Bhasma, Pittala, Kamsya and Varthaloha Bhasma, Shankha Bhasma, Shukti Bhasma, Kapardika Bhasma, Godanti Bhasma, Praval Bhasma, Mrigashringa Bhasma, Mayurpiccha Bhasma, Kukkutand twak Bhasma, Hiraka Bhasma, Manikyā Bhasma.

Dravaka - Shankha Dravaka

Pishti - Praval pishti, Manikyā Pishti, Mukta pishti, Jahara mohara pishti, Trinakanta mani pishti etc.

4. Detailed knowledge of manufacturing, storage, shelf life, pharmacopeial standards, therapeutic efficacy, dose, anupana and development of technology with Standard Operating Procedures of processing, standardization and quality control of Kharaliya rasa, Parpati, Kupipakva rasa and Pottali rasa.
5. Study of classical texts with respective commentaries and special emphasis on Rasarnava, Rasahridaya tantra, Rasa Ratna Samucchaya, Rasendra Chintamani, Rasendra Chudamani, Rasa Ratnakara, Rasadhyaya, Rasa Kamdhenu, Anandkanda, Siddha Bhesaja Manimala, Ayurveda Prakash, Rasatarangini, Bhaishajya Ratnavali, Rasamritam etc. and the books mentioned in the Schedule I of D & C Act – 1940. Relevant portions of Brihatrayi.

Paper II Bhaishajya Kalpana

Part A

1. History and Chronological evolution of Bhaishajya Kalpana, Concept of Bhesaja and Aushadh, fundamental principles of Bhaishajya Kalpana. Technical terminologies (Paribhasha) used in Bhaishajya Kalpana.
2. Classical and Contemporary concepts of Collection, storage, Saviryata Avadhi and preservation methods of different fresh and dry Aushadhi dravyas and their graahya agrahyatva
3. Detailed knowledge of routes of drug administration, Aushadha matra, Anupana, Sahapana, Aushadha Sevana Kala, Kala Avadhi, Pathya, Apathya (Posology).
4. Detailed knowledge of manufacturing, standardization, quality control, pharmacopeial standards, storage, shelf life and development of innovative technology with Standard manufacturing Operating Procedures of following dosage forms

- i) Panchavidha Kashaya, Churna, Rasakriya, Ghana, Avaleha, Pramathya, Mantha, Panaka, Sarkara, Kshirapaka, Ushnodaka, Aushadha Siddha Udaka, Sadangodaka, Tandulodaka, Laksharasa, Arka, Satva, Kshara, Lavana, Masi, Gutika, Vatika, Modaka, Guggulu and Varti etc.
- ii) Sneha Kalpana: Concept of accha sneha and sneha pravicharana and Murchhana. Sneha paka, types of sneha paka and sneha siddhi lakshana, Avartana. Sneha kalpa karmukata (Pharmacokinetics and dynamics of sneha kalpa). Role of Sneha in relation to absorption of drug.
- iii) Kritanna and Bhesaja Siddha Anna Kalpana, Aharopayogi varga, concept of medicinal and functional food, dietary supplements and nutraceuticals etc. iv) Sandhana kalpana: Madya varga and Shukta varga. Asava yoni. Alcoholic and acidic fermentation. Sandhana kalpa karmukata (Pharmacokinetics and dynamics). Advancements in fermentation technology. Knowledge of regulations in relation to alcoholic drug preparations.
- v) Bahya Prayogartha Kalpana : Lepa, Upanaha, Udvartan, Avachurnana / Avadhulana, Abhyanga, Dhupana, Malahara.
- vi) Mukha, Karna, Nasa, Netropacharartha Kalpana:
- vii) Basti Kalpana: Basti Yantra Nirmana, Types of basti. Anuvasana and Asthapana basti. Karma, kala and yoga basti etc. Basti Kalpa (Madhutailika, Piccha basti etc.), Comparison of Asthapana and Anuvasana basti with evacuation and retention enema.

Part B

All the following procedures are to be studied in relevance to Ayurvedic Bhaishajya Kalpas.

1. Methods of Expression and Extraction: Maceration, percolation, distillation, infusion and decoction.
2. **Liquids:** Clarified liquid, syrup, elixir, filtration techniques
3. **Solid dosage Forms: Powders:** Size reduction, separation techniques, particle size determination, principles of mixing. **Tablets:** Methods of tableting, suppositories, pessaries and capsules, sustained release dosage forms.
4. **Semisolid dosage forms,** emulsions, suspensions, creams and ointments, sterilization of ophthalmic preparations.
5. An introduction to various cosmetic preparations.
6. Drying, open and closed air drying, freeze drying, vacuum drying and other drying methods pharmaceutical excipients.
7. Study of classical texts with special emphasis on Chakradatta, Sharangadhara Samhita, Bhaishajya Ratnavali, Bhava Prakasha, Yogaratnakara, relevant portions of Brihatrayi, Ayurvedic Pharmacopeia of India, Ayurvedic Formulary of India.

Paper III Rasa Chikitsa & Aushadha Yoga Vigyana

PART- A

1. Rasachikitsa, Kshetrikaran, Rasajirna, Lohajirna, Aushadhi Sevana Vikarashanti Upaya. Ashuddha, Apakva, Avidhi Rasadravya Sevanajanya Vikara evam Vikara shanti upaya.
2. Detailed knowledge of Aushadhi patha Nischiti and sanyojan (formulation composition), dose, anupana and method of administration, therapeutic efficacy and uses (indications and contra-indications), probable mode of action etc. of the following Aushadhi yogas
 - i. **Kharaliya Rasa :** Shwasa kuthara Rasa, Tribhuvana kirti Rasa, Higuleshwara Rasa, Ananda bhairava Rasa, Maha Lakshmvilasa Rasa, Vasnata kusumakara Rasa, Vasanta multi Rasa, Brihat vata chintamani Rasa, Laghu suta shekhar Rasa, Suta shekhara Rasa, Ram ban Rasa, Chandra kala Rasa, Yogendra Rasa, Hridyarnava rasa, Grahani kapata Rasa, Garbha pala Rasa, Jalodarari Rasa, Mrityunjaya Rasa, Madhumalini vasanta Rasa, Arsha kuthara Rasa, Krimi mudgara Rasa, Suchika bharana Rasa, Tri netra Rasa, Smruti sagara Rasa, Vata gajankusha Rasa, Agni kumar Rasa, Ekangavir Rasa, Kama dugha Rasa, Purna chandrodaya Rasa, Pratap lankeshwara Rasa, Maha vata vidhwansaka Rasa, Kasturi bhairava Rasa, Ashwa kanchuki Rasa, Gulma kuthara Rasa, Maha jwarankusha Rasa, Chandra mrita Rasa, Kapha ketu Rasa, Prabhakara Vati, Pravala Panchamrita, Gandhaka Rasayana, Chaturbhuj rasa, Navajivan rasa, Shonitargal rasa, Raktapitta kulakandan rasa, Amavatari Rasa, Kravyada Rasa, Garbha chintamani Rasa, Chintamani Rasa, Trilokya chintamani Rasa, Pradarantaka Rasa, Vangeshwara Rasa, Brihat vangeshwara Rasa, Shwasakasa Chintamani Rasa, Arogya vardhini Vati, Chandra prabha Vati, Agni tundi vati, Shankha Vati.
 - ii. **Kupipakva Rasa:** Rasa Sindura, Makaradhwaja, Sidha makaradhwaja, Samira pannaga Swarnavanga, Malla sindura, Rasa karpura, Rasa pushpa, Manikya Rasa.
 - iii. **Parpati Rasa :** Rasa Parpati, Loha Parpati, Tamra Parpati, Suwarna Parpati, Gagana Parpati, Vijay Parpati, Panchamrit Parpati, Shwet Parpati, Bola Parpati iv.
 - Pottali Rasa:** Rasagarbha pottali, Hemagarbha pottali, Mallagarbha pottali, Hiranyagarbha pottali, Shankagarbha pottali, Lokanatha rasa, Mriganka Pottali
 - v. **Loha evam Mandura Kalpa:** Ayaskriti, Loha Rasayana, Amla pittantaka loha, Chandanadi loha, Dhatri loha, Navayasa loha, Putapakva vishama jwarantaka loha, Shilajatwadi loha, Tapyadi loha, Saptamrita loha, Dhatri loha Amritasara Loha, Shankaramat loha, Pradarantaka loha, Rohitaka loha. Punarnava Mandura, Shatavari Mandura, Tara Mandura, Triphala Mandura, Mandura Vataka etc.

Part B

Detailed knowledge of Aushadhi patha Nischiti and sanyojan (formulation composition), dose, anupana and method of administration, therapeutic efficacy and uses (indications and contra-indications), probable mode of action etc. of the following Aushadhi yogas

- i. **Panchavidha Kashayas and their Upakalpa:** Ardraka swarasa, Tulasi swarasa, Vasa putapaka swarasa, Nimba kalka, Rasona kalka, Kulattha Kwath, Punarnavasthaka kwatha, Rasna saptaka kwatha, Dhanyak hima, Sarivadi hima, Panchakola phanta, Tandulodaka,

Mustadi pramathya, Kharjuradi mantha, Shadanga paniya, Laksha rasa, Arjuna kshirapaka, Rasona kshirapaka, Chinchapa naka, Candana panaka, Banapsha sharkara, Nimbu sharkara, Amrita satva, Ardraka satva, Ajamoda arka, Yavanyadi arka **ii. Kritanna and Bhesaja Siddha Ahara Kalpana:** Yavagu, (Krita and Akrita), Ashtaguna manda, Laja manda, Peya, Vilepi, Krishara, Yusha, Mudga yusha, Kulattha yusha, Saptamushtika yusha, Khada, Kambalika, Raga, Shadava, Mamsarasa, Veshavara, Dadhi, Katvar Dadhi, Dadhi Mastu, Takra, Ghola, Udasvita, Mathita, Chhacchika etc.

iii. Churna: Sitopaladi Churna, Talisadi Churna, Triphala Churna, Hingvashtaka Churna, Avipattikara Churna, Swadishta Virechana Churna, Bhaskar Lavana Churna, Sudarshana Churna, Maha Sudarshana Churna, Gandharva Haritaki Churna, Pushyanuga Churna, Ajamodadi Churna, Hingvadi Churna, Eladi Churna, Dadimashtaka Churna, Trikatu Churna, Vaishwanara Churna, Gangadhara Churna, Jati phaladi Churna, Narayana Churna etc.

iv. Gutika: Arogya vardhani vati, Chandra prabha vati, Chitrakadi Gutika, Sanjivani Vati, Lasunadi vati, Lavangadi Vati, Vyoshadi vati, Khadiradi Vati, Kankayana Vati, Abhayadi modaka, Marichyadi gutika, Amalakyadi gutika, Samshamini Vati, Kutaja Ghana vati, Amarasundari Vati, Shiva Gutika, Eladi Vati, Kasturyadi Gutika, Arshoghni Vati.

v. Guggulu: Yogaraja Guggulu, Maha yogaraja Guggulu, Trayodashanga Guggulu, Kanchanara Guggulu, Rasnadi Guggulu, Triphala Guggulu, Simhanada Guggulu, Gokshuradi Guggulu, Kaishora Guggulu, Panchatikta Guggulu, Amritadi Guggulu, Vatari Guggulu, Lakshadi Guggulu, Abha Guggulu, Navaka Guggulu, Nava Karshika Guggulu.

vi. Sneha Kalpa

Sneha Moorchhana - Ghrita Murchhana, Taila Murchhana

Siddha Ghrita - Shatavari Ghrita, Jatyadi Ghrita, Phala Ghrita, Dadimadi Ghrita, Kshirashatpala Ghrita, Mahatriphala Ghrita, Dhanvantari Ghrita, Amritaprasha Ghrita, Kalyanaka Ghrita, Brahmi Ghrita, Changeri Ghrita, Panchatikta Ghrita, Sukumara Ghrita, Panchagavya Ghrita

Siddha Taila - Maha Narayana Taila, Maha Masha Taila, Bala Taila, Nirgundi Taila, Shadbindu Taila, Vishagarbha Taila, Sahacharadi Taila, Jatyadi Taila, Apamarga Kshara Taila, Tuvaraka Taila, Kshirabala Taila (Avartita), Lakshadi Taila, Anu Taila, Kumkumadi Taila, Hingutriguna Taila, Kottumchukadi Taila, Prasarinyadi Taila, Dhanwantari Taila, Balashwagandhadi Taila, Balaguduchyadi Taila, Nilibhringyadi Taila, Brihadavadi Taila, Irimedadi Taila, Chandanadi Taila, Panchaguna taila, Arka taila, Pinda Taila, Kasisadya Taila

vii. Rasakriya, Avaleha, Khanda etc.: Darvi Rasakriya, Vasa Avaleha, Brahma rasayana, Chyavanprasha Avaleha, Kushmanda Avaleha, Dadima Avaleha, Bilvadi Avaleha, Kantakaryavaleha, Haridra Khanda, Narikela khanda, Saubhagya shunthi paka, Amrita Bhallataka, Kamsa Haritaki, Chitraka Haritaki, Vyaghri Haritaki, Bahushala Guda, Kalyana Guda **viii. Sandhana Kalpa:** Lodhrasava, Kumaryasava, Ushirasava, Chandanasava, Kanakasava, Sarivadyasava, Pippalyasava, Lohasava, Vasakasava, Kutajarishta, Draksharishta, Raktamitrarka, Dashamularishta, Abhayarishta, Amritarishta, Ashokarishta, Sarasvatarishta,

Arjunarishta, Khadirarishta, Ashwagandha Arishta, Vidangarishta, Takrarishta, Mahadrakshasava, Mritasanjivani sura, Maireya, Varuni, Sidhu, Kanji, Dhanyamla, Madhu Shukta, Pindasava.

ix. Anya Kalpa : Phala varti, Chandrodaya varti, Arka lavana, Narikela lavana, Triphala masi, Apamarga kshara, Snuhi kshara, Ksharasutra, Atasi upanaha, Sarjarasa malahara, Gandhaka malahara, Sindhuradi Malahara, Shatadhouta Ghrita, Sahasra Dhouta Ghrita, Siktha taila, Dashanga lepa, Doshaghna lepa, Bhallataka taila patana, Jyotishmati Taila, Bakuchi Taila, Dashanga dhupa, Arshoghna dhupa, Nishadi Netra bindu, Madhutailika Basti, Piccha Basti, Yapana Basti.

PAPER – IV Pharmacology and Pharmacy Management

PART - A

- 1. General Pharmacology:**
 - a)** Principles of Pharmacology, Pharmacodynamics & Pharmacokinetics: Absorption, distribution, Metabolism & excretion, mechanism of action, dose determination and dose response, structure activity relationship.
 - b)** Routes of drug administration
 - c)** Factors modifying drug effect, Bioavailability and Bioequivalence, drug interactions, adverse drug reaction and drug toxicity
 - d)** Preclinical evaluation: experimental pharmacology [bioassay, in vitro, in vivo, cell line studies] animal ethics.
- 2. Clinical pharmacology: Evaluation of New Chemical Entity – phases and methods of clinical research. Ethics involved in human research.**
- 3. Elemental constituents of human body and its physiological importance. Deficiencies and excess of various elements (micro-nutrients).**
- 4. Toxicity of heavy metals and chelation therapy.**
- 5. Knowledge of toxicity and pharmacological activities of herbo-mineral compounds.**
- 6. Detailed Knowledge of Pharmacovigilance – National and International Scenario. Pharmacovigilance of Ayurvedic Drugs**

Part B

- 1. Scope and evolution of pharmacy. Information resources in pharmacy and pharmaceutical Science.**
- 2. Pharmaceutical dosage form design (Pre-formulation)**
- 3. Packaging materials and Labeling**
- 4. Management of pharmacy, store and inventory management, personnel management, Good Manufacturing Practices related to Ayurvedic drug industry.**
- 5. Pharmaceutical Marketing, product release and withdrawals.**
- 6. Hospital, Dispensing and Community pharmacy.**
- 7. Patenting and Intellectual Property Rights.**
- 8. Laws Governing Ayurvedic drugs**

- i. Relevant regulatory provisions of Ayurvedic drugs in Drug and Cosmetics Act - 1940 and Rules - 1945
- ii. Laws pertaining to Drugs and Magic remedies (Objectionable Advertisement) Act - 1954.
- iii. Prevention of Food Adulteration (PFA) act.
- iv. Food Standards and Safety Act - 2006
- v. Laws pertaining to Narcotics
- vi. Factory and Pharmacy Acts
- vii. Consumer Protection Act -1986

9. Regulatory Affairs related to International Trade and Practices of Ayurvedic Drugs

10. Introduction to Ayurvedic Pharmacopoeia of India, Ayurvedic Formulary of India.

11. Introduction to Indian Pharmacopoeia, British and United States Pharmacopoeia, Pharamcoepial Codex

12. Introduction to Traditional Knowledge Digital Library

Practicals:-

Minimum 150 Practical are to be performed covering all the dosage forms.

Educational Visits to minimum Five (5) GMP approved Ayurvedic Pharmacies.

Ten days posting in R & D / Production unit in GMP certified Ayurvedic Pharmacy.

Minimum attendance in three National Conferences within three academic years. Minimum 10 clinical cases using different dosage forms are to be studied and recorded for efficacy and ADRs (if any).

Minimum one research paper on the core contributory work of dissertation published or accepted in peer reviewed, indexed journal.

Examinee has to submit supporting documents in relation to above mentioned academic activities at the time of Practical examination.

Pattern of Practical Examination

Total Marks : 100

Duration of the practical: 2 days

1. Identification of the specimen:

10 Marks

2. Drug Processing

30 Marks

(10+10+5+5)

i) Major Practicals: 2 (1 Rasashastra and 1 Bhaishajya Kalpana)

ii) Minor Practicals: 2 (1 Rasashastra and 1 Bhaishajya Kalpana)

3. Drug testing and Analysis

10 Marks (5+5)

- i) Rasaushadhi – 1
- ii) Kashthaushadhi – 1

4. Power Point Presentation on dissertation work: 15 Minutes 10 Marks

6. A Demo Lecture on any subject topic: 10 Minutes. 10 Marks

7. Documentation 15 Marks

- i. Journals (Practical Records) of minimum 75 practicals (25 each from Rasa Shastra, Bhaishajya Kalpana and Analytical part).
- ii. Reports of the Visits
- iii. Case Records

8. Viva Voce examination

15 Marks

Reference Books:-

Rasahridaya Tantra

Rasarnava

Rasaratna Samuccahaya

Ayurved Prakasha

Rasendrachudamani

Rasendra Chintamani

Rasatarangini

Rasaparaksha Sudhakar

Rasamrita

Rasa Chandanshu : CCRAS Publication

Sharangadhara Samhita

Sharangadhara Darpan (BP Pandey)

Bhavaprakasha

Yoga Ratnakara

Bhaishajya Ratnavali

Siddha Bhaishajya Manimala

Ayurvediya Aushadhikarana – Puranik and Dhamanakar Bharat Bhaishajya
Ratnakara

Rasayoga Sagara

Siddha Bhaishajya Manimala

Siddha Yoga Sangraha – Yadavaji Trikamji Acharya

Sahasrayoga

Vaidyaka Paribhasha Pradeepa

Dravyaguna Vijnan Part - 1 and 2 - Yadavji Trikamji Chakradatta -
Ratnaprabha,

Relevant Parts from Charaka Samhita, Sushruta Samhita, Kashyapa
Samhita, Ashtanga Sangraha, Ashtanga Hridaya,

Remington: Science and Practice of Pharmacy

Theory and Practice of Industrial Pharmacy – Leon Lachman *et al* Clinical
Pharmacology, KD Tripathi

Clinical Pharmacology, Lawrence Benette

Drug Discovery and Evaluation (Pharmacological assays) HG Vogel
Pharmacological Basis of therapeutics – Goodman and Gilman Data Base of
Medicinal Plants of CCRAS

Quality and Standards of Medicinal Plants – ICMR publication

Quality Control of Ayurvedic Drugs – PLIM, Gaziabad

Ayurvedic Pharmacopeia of India

Ayurvedic Formulary of India

Indian Pharmacopeia

British Pharmacopeia

United States Pharmacopeia

Pharmacopeia Codex

Current Good Manufacturing Practices

Drugs and Cosmetic Act 1940 and Rules 1945 with latest amendments

Drugs and Magic remedies (Objectionable advertisement) Act-1954

Prevention of Food Adulteration (PFA) act

Laws pertaining to Narcotics

Factory and Pharmacy Acts

Consumer Protection Act -1986

Brief information on the peer reviewed journals, official websites and other official search engines along with their links (related with the subject) Rutleys Elements of Mineralogy

Bhasma Vigyaniam

Kupipakva Vigyaniam

Anupana Manjari
