BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE

FACULTY OF AYURVED
MD - KRIYA SHARIR
New Syllabus

BHARATI VIDYAPEETH

(DEEMED TO BE UNIVERSITY) PUNE, INDIA.

FACULTY OF AYURVED

Pune- Satara Road, Pune-411043.

KRIYA SHARIR

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

Contents

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 Tantragya), 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 Sangyaharan [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 Hridya, 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 & Diseasewise 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 50^{th} percentile in the All India AYUSH Post Graduate Entrance Taste (AIAPGET) .
- Candidates belonging to the scheduled castes, Scheduled Tribes and other Backward Classes the minimum marks shall be at 40^{th} 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 specialty			
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 specialty			
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 specialty			
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 – Shalakya	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 subspecialties 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./M.S.-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 andlimitations
C. Defining research problem and formulation of hypothesis
D. Defining general and specific objectives
E. Research design: observational and interventional, descriptive and analytical, preclinical andclinical, 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 fillingup 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 koshtha.

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 parametersas 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 withAYUSH 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 approachtechniques; 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 andFocus Group Discussion.

13. Pharmacovigilance for ASU drugs. Need, scope and aims & objectives. National PharmacovigilanceProgramme 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 KnowledgeDigital 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 andmethods)

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 deviationand Standard deviation

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

6 **Normal distribution**: Concept and Properties, Sampling distribution, Standard Error, Confidence Intervaland 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 theirconfidence 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, Kruskall – Wallis with relevant post hoc tests (Dunn)

11 Correlation and regression analysis:
Concept, properties, computation and applications of correlation, Simple linear correlation, KarlPearson'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 sizecomputation, computation of sample size for comparing two means, two proportions, estimating meanand proportions.

13 **Vital statistics and Demography**:
computation and applications - Rate, Ratio, Proportion, Mortality andfertility 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 researchDrug 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 abasic 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 houís: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

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2. Drug Survey by Mayaram Uniyal
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4. Kokate, CK., Purohit, AP, Gokhale, SB (2010). Pharmacognosy. Nirali Prakashan. Pune.
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M.D.-AYURVEDA PRELIMINARY
KRIYA SHARIR

PAPER-II

Theory 100 Marks

PART-A 50 marks

1. Theory of Loka-Purusha Samya
2. Theory of Panchamahabhuta
3. Physiological aspects of Samanya – Vishesha siddhanta
4. Concepts of Tridosha and Triguna
5. Concept of Dhatu
6. Concept of Mala
7. Description of Ojas
8. Process of Ahara Parinama including Aharaparinamakara Bhava and Asta Ahara Vidhi Visesayatana
9. Physiological importance of Agni, its classification and functions
10. Dhatuposana theories
11. Concepts of Atma, Manas and Indriya.
12. Concepts of Prakriti and Ashtavidha Sara.
13. Concept of Srotas

PART-B 50 marks

Description of essential and relevant understandings related to contemporary physiology, both general physiology and systemic physiology.

1. Essentials of cell physiology – organization of cell.
2. Membrane physiology- transport across cell membrane, action potentials and resting membrane potentials.
3. Homeostasis- negative and positive feedback mechanisms.
4. Genetic code, its expression and regulation of gene expression.
5. Essentials of cardiovascular physiology- cardiac cycle, regulation of heart rate and blood pressure.
6. Essentials of respiratory physiology- regulation of respiration-chemical and neural, gaseous exchange, transportation of gases.
7. Gastrointestinal physiology- various digestive juices and their actions, gastrointestinal hormones, enteric nervous system.
8. Nervous system physiology- ANS, somatic nervous system, reflexes, general and special sensations, higher mental functions, functions of brain, brainstem and spinal cord.
9. Blood: Blood cells-RBCs, WBCs, platelets, plasma proteins and immunity.
10. Muscle physiology: properties and mechanisms of contraction of skeletal, cardiac and smooth muscles.
11. Physiology of excretion- mechanism of urine formation, micturition.
12. Endocrine physiology: Classification of hormones, hormones secreted by pituitary,

thyroid, parathyroid, adrenal glands, pineal, pancreas and their functions.
Study of male and female reproductive system: functions of reproductive hormones.

PRACTICAL 100 marks

Contents:
Ayurvedic practicals Assessment of Prakriti Assessment of Sara Pramana Pariksha Hematology Hemoglobin estimation Total RBC count
Total WBC count Differential leukocyte count Packed cell volume (PCV) ESR
Bleeding time Clotting time
Blood grouping and Rh typing
Urine examination -
Physical examination- Specific gravity and reaction of urine
Chemical examination
Albumin test Sugar test Ketone bodies
Bile salts and pigments

Distribution of marks (Practical)

1. Laboratory Practical - 20
2. Human Experiment - 15
3. Spotting - 15
4. Prakriti Saradi pariksha - 20
5. Practical Record - 10
6. Viva-voce - 20

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5. Abhinava Sharir Kriya Vigyana - Acharya Priyavrata Sharma
6. Dosha Dhatu Mala Vigyana - Shankar Gangadhar Vaidya
7. Prakrita Dosha Vigyana - Acharya Niranjana Dev
8. Tridosha Vigyana - Shri Upendranath Das
9. Sharira Tatva Darshana - Hirlekar Shastri
10. Prakrita Agni Vigyana - Niranjana Dev
11. Deha Dhatvagni Vigyana - Vd. Pt. Haridatt Shastri
12. Sharir Kriya Vigyana (Part 1-2) - Acharya Purnchandra Jain
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19. Concept of Agni - Vd. Bhagwan Das

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42. Tridosha Theory - Subrahmanya Shastri
43. Statistics in Medicine - K. Syamalan

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M.D.-AYURVEDA FINAL
KRIYA SHARIR
(Physiology)

Paper- I (Dosa-Dhātu-Mala Vijñāna)

Contribution of different Ayurveda Samhita in Kriya Sharir

- Theory of Pancamahābhūta
- Principle of Loka-Purusa Sāmya
- Importance of Sāmānya - Viśesa principle.
- Different views on the composition of Purusa and the importance of Cikitsya Purusa.
- Importance of Gurvādi Guna in Ayurveda.
- General description of Tridosa theory
- Mutual relationship between Triguna-Tridosa-Pancamahābhūta-Indriya.
- Mutual relationship between Rtu-Dosa-Rasa-Guna.
- Biological rhythms of Tridosa on the basis of Day-Night-Age-Season and Food intake.
- Role of Dosa in the formation of Prakrti of an individual.
- Role of Dosa in maintaining health.
- Vāta Dosa: General locations (Sthāna), general attributes (Guna) and general functions (Sāmānya Karma). Five subdivisions of Vāta with their specific locations, specific properties, and specific functions (Prāna, Udāna, Samāna, Vyāna, Apāna)
- Pitta Dosa: General locations (Sthāna), general attributes (Guna) and general functions (Sāmānya Karma). Five subdivisions of Pitta with their specific locations, specific properties, and specific functions (Pācaka, Ranjaka, Ālocaka, Bhrājaka, Sādhaka). Similarities and differences between Agni and Pitta.
- Kapha Dosa: General locations (Sthāna), general attributes (Guna) and general functions (Karma) of Kapha. Five subdivisions of Kapha with their specific locations, specific properties, and specific functions (Bodhaka, Avalambaka, Kledaka, Tarpaka, Ślesaka).
- Applied physiology of Tridosa principle: Kriyākāla, Dosa Vrddhi-Dosa Ksaya.
- Dhātu Posana: Process of nourishment of Dhātu. Description of various theories of Dhātu Posana (Ksīra-Dadhi, Kedārī-Kulya, Khale Kapota etc).
- Dhātu: General introduction and definition of Dhātu. Formation, Definition (Nirukti), Distribution, Attributes, quantity, classification, Pāñcabhautika composition and

Functions of all seven Dhātus in detail: Rasa, Rakta, Māmsa, Meda, Asthi, Majjā, Śukra.

- Applied physiology of Dhātu: Manifestations of Ksaya and Vriddhi of each Dhātu. Description of Dhātu Pradosaja Vikāra.
- Description of Āśraya and Āśrayī kind of relationship between Dosa and Dhātu.
- Description of the characteristic features of Astavidha Sāra. Description of Rasavaha, Raktavaha, Māmsavaha, Medovaha, Asthivaha, Majjāvaha and Śukravaha Srotāmsi.
- Ojas: Definition, locations, synonyms, Formation, Distribution, Properties, Quantity, Classification and Functions of Ojas. Description of Vyādhiksamitva. Bala Vrddhikara

Bhāva. Classification of Bala. Relation between Ślesmā, Bala and Ojas.

- Applied physiology of Ojas: Etiological factors and manifestations of Ojaksaya,

Visramsa and Vyāpat. Physiological and clinical significance of Ojas.

- Upadhātu: General introduction and Definition of the term 'Upadhātu'. Formation, Nourishment, Quantity, Properties, Distribution and functions of each Upadhātu. • Stanya: Characteristic features and methods of assessing Śuddha and Dūsita Stanya, Manifestations of Vrddhi and Ksaya of Stanya.
- Ārtava: Characteristic features of Śuddha and Dūsita Ārtava. Differences between Raja and Ārtava, physiology of Ārtavavaha Srotāmsi.
- Study of Tvak
- Physiology of Mala - Definition of the term 'Mala'. Definition, Formation, Properties, Quantity and Functions of Purīsa, Mutra. Manifestations of Vrddhi and Kshaya of

Purīsa and Mūtra.

- Sveda – Definition, Formation, Properties, Quantity and Functions of Svedavaha Srotāmsi. Formation of Sveda. Manifestations of Vrddhi and Ksaya of Sveda.
- Dhātumala – Definition, Formation, properties, Quantity, Classification and Functions of each Dhātumala .

Paper-II - Prakrti- Sattva Vijñāna

- Deha-Prakrti: Various definitions and synonyms for the term 'Prakrti'. Factors influencing the Prakrti. Classification of Deha-Prakrti. Characteristic features of the individuals belonging to each kind of Deha-Prakti. Recent advances in understanding the Prakrti.
- Pancajnanendriya: Physiological description of Pancajnanendriya and physiology of perception of Śabda, Sparśa, Rūpa, Rasa, Gandha. Indriya-panca-pancaka; Physiological description of Karmendriya.
- Manas – Definition, location (sthana), Properties, Functions and Objects of Manas.

- Ātmā – Definition, Properties of Ātmā. Difference between Paramātmā and Jīvātmā; Characteristic features of Ātmā.
- Buddhi – Location, Types, Functions of Buddhi; Physiology of Dhī, Dhrti and Smrti.
- Nidrā – Definition of Nidrā, Classification of Nidrā. Tandra, physiological and clinical significance of Nidra; Svapnotpatti and Svapnabheda.
- Physiology of special senses. Intelligence, Memory, Learning and Motivation.
- Physiology of sleep.
- Physiology of speech and articulation;
- Physiology of Pain and temperature.

Paper-III - Kosthanga Kriya Vijñāna

- Āhāra: Definition and significance of Āhāra. Classification of Āhāra. Āhāra-vidhividhāna. Asta āhāravidhi viśesāyatana, Āhāraparināmakara bhāva.
- Āhārpāchana: Āhāra Pāka Prakriyā, Description of Annavaha Srotās. Description of Avasthāpāka and Nishthapaka. Role of dosha in Āhārapāka. Sāra and Kitta

Vibhajana. Absorption of Sāra. Utpatti and Udieeran of Vāta-Pitta-Kapha.

- Definition of the term Kostha. Physiological classification of Kostha and the characteristics of each kind of Kostha.
- Agni: Description of the importance of Agni. Classification of Agni. Locations, properties and functions of Jātharāgni, Bhūtāgni, and Dhātvagni.
- Applied physiology of Agni in Kriyā Śārīra and Cikitsā.
- Description of the aetiology and features of Annavaha Srotodusti. Applied physiology of Annavaha Srotās: Arocaka, Ajīrna, Atīsāra, Grahanī, Chardi, Parināma Śūla Agnimāndya.
- Description of the process of digestion of fats, carbohydrates and proteins in human gastrointestinal tract. Different digestive juices, their enzymes and their mechanisms of action. Functions of Salivary glands, Stomach, Pancreas, Small intestine, Liver and large intestine in the process of digestion and absorption.
- Movements of the gut (deglutition, peristalsis, defecation etc.) and their control. Role of neuro-endocrine mechanisms in the process of digestion and absorption. Enteric nervous system.
- Applied physiology of gastrointestinal tract: Vomiting, Diarrhoea, Malabsorption etc.
- Recent understandings related to the gut microbiota and their role in health and disease.
- Introduction to biochemical structure, properties and classification of proteins, fats and carbohydrates.

- Description of the processes involved in the metabolism of proteins, fats and carbohydrates.
- Vitamins: sources, daily requirement and functions. Physiological basis of signs and symptoms of hypo and hyper-vitaminosis.

Paper-IV - Modern Physiology and its applied aspect

Physiology of Neuro-Immune-Endocrine Mechanisms:

- Physiology of Nervous System. General introduction to nervous system: neurons, mechanism of propagation of nerve impulse.
- Study of CNS, PNS and ANS. Sensory and motor functions of nervous system. Functions of different parts of brain and spinal cord, Hypothalmus and limbic system
- Physiology of Endocrine system. Classification and characteristics of different hormones. Description of hormones secreted by Hypothalamus, Pituitary gland, Thyroid gland, Parathyroid glands, Pancreas, Adrenal glands and their physiological effects. Effects of hypo and hyper-secretion of various hormones.
- Male and female reproductive physiology. Spermatogenesis and oogenesis. Hormonal regulation of uterine and ovarian cycles. Physiology of pregnancy and lactation. Parturition.
- Adipose tissue and its Function. Circulating lipids. Description of lipoproteins like VLDL, LDL and HDL and their composition.
- Physiology of immune system. Definition and classification of immunity: Innate, acquired and artificial. Mechanisms involved in humoral and cell mediated immunity.

Cardiovascular physiology, Respiratory physiology and Blood:

- Physiology of Cardio-Vascular system: Functional anatomy of cardiovascular system. Cardiac cycle. Heart sounds. Regulation of cardiac output and venous return. Physiological basis of ECG. Heart-rate and its regulation. Arterial pulse. Systemic arterial blood pressure and its control. Regional circulations. Physiology of lymphatic circulation.
- Physiology of Respiratory system: Functional anatomy of respiratory system. Ventilation. Mechanism of respiration. Exchange and transportation of gases. Neural and chemical control of respiration. Spirometry and lung function tests. Artificial respiration.
- Functions of Haemopoetic system: Composition and functions of blood and blood cells. Haemopoiesis- (stages and development of RBCs, WBCs and platelets); Introduction to bone marrow: composition and functions of bone marrow. Structure and functions of haemoglobin, mechanism of blood clotting, study of platelets. physiological basis of blood groups. Principles of blood transfusion, plasma proteins- synthesis and functions. Applied physiology: Anaemia, Jaundice.

Musculoskeletal Physiology:

- Physiology of muscles. Classification of muscles. Electrical and mechanical properties of Cardiac, skeletal and smooth muscles.

Physiology of Excretion:

- Physiology of excretion. Functional anatomy of urinary tract. Functions of kidneys. Mechanism of formation of urine. Control of micturition. Renal function tests.
- Structure and functions of skin, sweat glands and sebaceous glands.

Learners should be well versed with the following instruments-

- Physiograph, Computerised spirometry, Biochemical Analyzer, Pulse oxymeter, Elisa Reader, Hematology Analyzer, Tread mill

Bridge areas including recent advances:

- Recent studies in biorhythms.
- Recent advances in Neuro-Immune-Endocrine physiology.
- Recent advances in stem cell research

PRACTICAL

Ayurvedic practicals

- Assessment of Prakrti
- Assessment of Sāra
- Assessment of Dosa Vrddhi Ksaya Laksana
- Assessment of Dhātu Vrddhi – Ksaya Laksana
- Assessment of Agni
- Assessment of Kostha
- Assessment of Śarīra Bala through Vyāyāma Śakti
- Mūtra Parīksa
- Nādī Parīksā
- Anguli Pramāna
- Assessment of Sātmya

Hematology

- Use and care of Compound microscope
- Histological study of different organs
- Hemoglobin estimation
- Total RBC count
- Total WBC count
- Differential leukocyte count
- Packed cell volume (PCV)
- ESR
- Bleeding time
- Clotting time
- Blood grouping and Rh typing

Urine examination

Physical examination

- Specific gravity and reaction of urine
- Detecting the presence of Albumin in urine
- Detecting the presence of Sugar in urine
- Detecting the presence of Ketone bodies in urine
- Detecting the presence of Bile salts and bile pigments in urine

Cardio-Vascular system

- Clinical methods of examining cardiovascular system
- Examination of Arterial Pulse
- Arterial blood pressure measurement: Effect of posture, exercise and cold pressor test on Blood Pressure
- ECG recording and its interpretation
- Heart Sounds

Respiratory system

- Clinical examination of Respiratory System
- Lung Function Tests including Spirometry

Nervous System

- Clinical examination of nervous system
- Examination of higher mental functions
- Examination of cranial nerves
- Examination of reflexes
- Examination of sensory functions
- Examination of motor functions
- Examination of Autonomic Nervous System
- EEG recording (Demonstration)

Reference Books

- Ayurvediya Kriyasharir - Ranjit rai Desai
- Kayachikitsa Parichaya - C. Dwarikanath
- Prakrit Agni Vigyan - C. Dwarikanath
- Sharir Kriya Vigyan - Shiv Charan Dhyani
- Abhinava Sharir Kriya Vigyana - Acharya Priyavrata Sharma
- Dosha Dhatu Mala Vigyana - Shankar Gangadhar Vaidya
- Prakrita Dosha Vigyana - Acharya Niranjana Dev
- Tridosha Vigyana - Shri Upendranath Das
- Sharira Tatva Darshana - Hirlekar Shastri
- Prakrita Agni Vigyana - Niranjana Dev
- Deha Dhatvagni Vigyana - Vd. Pt. Haridatt Shastri
- Sharir Kriya Vigyana (Part 1-2) - Acharya Purnchandra Jain
- Sharir Kriya Vigyana - Shri Moreshwar Dutt. Vd.
- Sharira Kriya Vijnana (Part 1 and 2) – Nandini Dhargalkar
- Dosha Dhatu Mala Vigyana - Basant Kumar Shrimal
- Abhinava Sharir Kriya Vigyana - Dr. Shiv Kumar Gaur

- Pragyogik Kriya Sharir - Acharya P.C. Jain
- Kaya Chikitsa Parichaya - Dr. C. Dwarkanath
- Concept of Agni - Vd. Bhagwan Das
- Purush Vichaya - Acharya V.J. Thakar
- Kriya Sharir - Prof. Yogesh Chandra Mishra

- Sharir Kriya Vigyana - Prof. Jayaram Yadav &Dr. Sunil Verma.
- Basic Principles of Kriya-Sharir

(A treatise on Ayurvedic Physiology) - Dr. Srikant Kumar Panda

- Sharir Kriya – Part I & Part II – Dr. Ranade, Dr. Deshpande & Dr. Chobhe
- Human Physiology in Ayurveda - Dr Kishor Patwardhan
- Sharirkriya Vignyan Practical Hand Book – Dr.Ranade, Dr.Chobhe, Dr. Deshpande
- Sharir Kriya Part 1 – Dr.R.R.Deshapande, Dr.Wavhal
- Sharir Kriya Part 2 – Dr.R.R.Deshapande, Dr.Wavhal
- Textbook of Physiology - Gyton & Hall
- Review of medical physiology – William Ganong
- Essentials Of Medical Physiology - Sembulingam, K.
- Concise Medical Physiology - Chaudhari, Sujit. K.
- Fundamental of Anatomy & Physiology - Martini
- Principals of Anatomy & Physiology - Tortora & Grabowski
- Human Physiology - Richards, Pocock
- Samson Wrights Applied Physiology, Keele, Neil, joels
- Brainstem Control of Wakefulness And Sleep- Steriade, Mirce
- An Introduction to Human Physiology - Green, J.h.
- Ancient Indian Medicine - Kutumbiah P.
- Biographical History of Indian Medicine - Srikanthamurthy KR
- Ayurveda Kriya Sharira - Yogesh Chandra Mishra
- Textbook of Medical Physiology - Indu Khurana
- Tridosha Theory - Subrahmanya Shastri
- Statistics in Medicine - K. Syamalan

Important journals to refer:

1. Advances in Physiology Education
2. Academic Medicine
3. Indian journal of Physiology and Pharmacology
4. Journal of Ayurveda and Integrative Medicine
5. Evidence-based Complementary and Alternative Medicine
6. AYU
7. All journals of American Physiological Society
8. Journal of Physiology

Important research papers to refer:

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2. Prasher B, Negi S, Aggarwal S, Mandal AK, Sethi TP, Deshmukh SR, Purohit SG, Sengupta S, Khanna S, Mohammad F, Garg G, Brahmachari SK; Indian Genome Variation Consortium, Mukerji M. Whole genome expression and biochemical correlates of extreme constitutional types defined in Ayurveda. J Transl Med. 2008 Sep 9;6:48.

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Pharmacogenomics: Ayurveda Prakriti Type and CYP2C19 Gene Polymorphism

Associated with the Metabolic Variability. Evid Based Complement Alternat Med. 2009 Dec 16. [Epub ahead of print]

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Bharati Vidyapeeth
Deemed to be University, Pune
Faculty of Ayurved
Programme- MD Ayurved in Kriya Sharir

Addition in syllabus of Kriya Sharir

Study of recent advances in the understanding of different biophysical and biochemical mechanisms involved in physiology and their correlation with Ayurvedic fundamentals.

Basics of Biophysics and Biochemistry.

Modern laboratory and ayurvedic and clinical methods to assess the functional mechanism of dosha, dhatu, mala and other factors.

Practical knowledge of care and usage of equipments like stethoscope, sphygmomanometer, haemoglobinometer, haemocytometer, spirometer, kymograph, thermometer etc.

Methods of estimating blood sugar, serum lipids, serum protein, serum creatinine, serum cholesterol and blood urea. Practical knowledge of care and usage of equipments like stethoscope, sphygmomanometer, haemoglobinometer, haemocytometer, spirometer, kymograph, thermometer etc.

Methods of estimating blood sugar, serum lipids, serum protein, serum creatinine, serum cholesterol and blood urea.

- Modern Immune Physiology:

Anatomy in Immune Mechanism, History of development of Immune Physiology, Innate and Acquired Immunity, Cells in Immunity, Immunoglobulins, Immunological Memory.

Macro and Micro nutrition for Immunity. Control and Interrelationship of Immune mechanism with other systems. Concept of Immune Homeostasis, Immune Suppression, Immune Modulation. Recent advances in Ayurveda immune modulation.

- Ayurveda Immune Physiology:

Concept of Vyadhikshamatwa, Concept of Bala, Types of Bala, Ayurveda sharir Bhava involved in Immune mechanism, Ahara and Vihara as variables in ayurvedic immune mechanism.

BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE

FACULTY OF AYURVED
MD - KRIYA SHARIR
Old Syllabus

BHARATI VIDYAPEETH

(DEEMED TO BE UNIVERSITY) PUNE, INDIA.

FACULTY OF AYURVED

Pune- Satara Road, Pune-411043.

Kriya Sharir

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

Contents

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 Tantragya), 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 Sangyaharan [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 Hridya, 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 & Diseasewise 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 50^{th} percentile in the All India AYUSH Post Graduate Entrance Taste (AIAPGET) .
- Candidates belonging to the scheduled castes, Scheduled Tribes and other Backward Classes the minimum marks shall be at 40^{th} 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 specialty			
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 specialty			
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 specialty			
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 – Shalakya	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 subspecialties 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./M.S.-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 andlimitations
C. Defining research problem and formulation of hypothesis
D. Defining general and specific objectives
E. Research design: observational and interventional, descriptive and analytical, preclinical andclinical, 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 fillingup 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 koshtha.

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 parametersas 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 withAYUSH 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 approachtechniques; 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 andFocus Group Discussion.

13. Pharmacovigilance for ASU drugs. Need, scope and aims & objectives. National PharmacovigilanceProgramme 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 KnowledgeDigital 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 andmethods)

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 deviationand Standard deviation

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

6 **Normal distribution**: Concept and Properties, Sampling distribution, Standard Error, Confidence Intervaland 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 theirconfidence 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, Kruskall – Wallis with relevant post hoc tests (Dunn)

11 Correlation and regression analysis:
Concept, properties, computation and applications of correlation, Simple linear correlation, KarlPearson'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 sizecomputation, computation of sample size for comparing two means, two proportions, estimating meanand proportions.

13 **Vital statistics and Demography**:
computation and applications - Rate, Ratio, Proportion, Mortality andfertility 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 researchDrug 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 abasic 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 houís: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

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8. Laboratory Guide for- The Analysis of Ayurved and Siddha Formulations – CCRAS, New Delhi.
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Biochemistry and Laboratory techniques:

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Drug research and development:

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M.D.-AYURVEDA PRELIMINARY
KRIYA SHARIR

PAPER-II

Theory 100 Marks

PART-A 50 marks

1. Theory of Loka-Purusha Samya
2. Theory of Panchamahabhuta
3. Physiological aspects of Samanya – Vishesha siddhanta
4. Concepts of Tridosha and Triguna
5. Concept of Dhatu
6. Concept of Mala
7. Description of Ojas
8. Process of Ahara Parinama including Aharaparinamakara Bhava and Asta Ahara Vidhi Visesayatana
9. Physiological importance of Agni, its classification and functions
10. Dhatuposana theories
11. Concepts of Atma, Manas and Indriya.
12. Concepts of Prakriti and Ashtavidha Sara.
13. Concept of Srotas

PART-B 50 marks

Description of essential and relevant understandings related to contemporary physiology, both general physiology and systemic physiology.

1. Essentials of cell physiology – organization of cell.
2. Membrane physiology- transport across cell membrane, action potentials and resting membrane potentials.
3. Homeostasis- negative and positive feedback mechanisms.
4. Genetic code, its expression and regulation of gene expression.
5. Essentials of cardiovascular physiology- cardiac cycle, regulation of heart rate and blood pressure.
6. Essentials of respiratory physiology- regulation of respiration-chemical and neural, gaseous exchange, transportation of gases.
7. Gastrointestinal physiology- various digestive juices and their actions, gastrointestinal hormones, enteric nervous system.
8. Nervous system physiology- ANS, somatic nervous system, reflexes, general and special sensations, higher mental functions, functions of brain, brainstem and spinal cord.
9. Blood: Blood cells-RBCs, WBCs, platelets, plasma proteins and immunity.
10. Muscle physiology: properties and mechanisms of contraction of skeletal, cardiac and smooth muscles.
11. Physiology of excretion- mechanism of urine formation, micturition.
12. Endocrine physiology: Classification of hormones, hormones secreted by pituitary,

thyroid, parathyroid, adrenal glands, pineal, pancreas and their functions.
Study of male and female reproductive system: functions of reproductive hormones.

PRACTICAL 100 marks

Contents:
Ayurvedic practicals Assessment of Prakriti Assessment of Sara Pramana Pariksha Hematology Hemoglobin estimation Total RBC count
Total WBC count Differential leukocyte count Packed cell volume (PCV) ESR
Bleeding time Clotting time
Blood grouping and Rh typing
Urine examination -
Physical examination- Specific gravity and reaction of urine
Chemical examination
Albumin test Sugar test Ketone bodies
Bile salts and pigments

Distribution of marks (Practical)

1. Laboratory Practical - 20
2. Human Experiment - 15
3. Spotting - 15
4. Prakriti Saradi pariksha - 20
5. Practical Record - 10
6. Viva-voce - 20

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3. Prakrit Agni Vigyan - C. Dwarkanath
4. Sharir Kriya Vigyan - Shiv Charan Dhyani
5. Abhinava Sharir Kriya Vigyana - Acharya Priyavrata Sharma
6. Dosha Dhatu Mala Vigyana - Shankar Gangadhar Vaidya
7. Prakrita Dosha Vigyana - Acharya Niranjana Dev
8. Tridosha Vigyana - Shri Upendranath Das
9. Sharira Tatva Darshana - Hirlekar Shastri
10. Prakrita Agni Vigyana - Niranjana Dev
11. Deha Dhatvagni Vigyana - Vd. Pt. Haridatt Shastri
12. Sharir Kriya Vigyana (Part 1-2) - Acharya Purnchandra Jain
13. Sharir Kriya Vigyana - Shri Moreshwar Dutta Vd.
14. Sharira Kriya Vijnana (Part 1-2) - Nandini Dhargalkar
15. Dosha Dhatu Mala Vigyana - Basant Kumar Shrimal
16. Abhinava Sharir Kriya Vigyana - Dr. Shiv Kumar Gaur
17. Pragyogik Kriya Sharir - Acharya P.C. Jain
18. Kaya Chikitsa Parichaya - Dr. C. Dwarkanath

19. Concept of Agni - Vd. Bhagwan Das

20. Purush Vichaya - Acharya V.J. Thakar
21. Kriya Sharir - Prof. Yogesh Chandra Mishra
22. Sharir Kriya Vigyana - Prof. Jayaram Yadav & Dr. Sunil Verma
23. Basic Principles of Kriya-Sharir (A treatise on Ayurvedic Physiology) by -Dr. Srikant Kumar Panda
24. Sharir Kriya – Part I & II - Dr. Ranade, Dr. Deshpande & Dr. Chobhe
25. Human Physiology in Ayurveda - Dr Kishor Patwardhan
26. Sharirkriya Vignyan Practical Hand Book - Dr.Ranade, Dr.Chobhe, Dr. Deshpande
27. Sharir Kriya Part 1&2 - Dr.R.R.Deshapande, Dr.Wavhal
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33. Principals of Anatomy & Physiology - Tortora & Grabowski
34. Human Physiology - Richards, Pocock
35. Samson Wrights Applied Physiology, Keele, Neil, joels
36. Brainstem Control of Wakefulness And Sleep - Steriade, Mirce
37. An Introduction to Human Physiology - Green, J.h.
38. Ancient Indian Medicine - Kutumbiah P.
39. Biographical History of Indian Medicine - Srikanthamurthy KR
40. Ayurveda Kriya Sharira - Yogesh Chandra Mishra
41. Textbook of Medical Physiology - Indu Khurana
42. Tridosha Theory - Subrahmanya Shastri
43. Statistics in Medicine - K. Syamalan

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M.D.-AYURVEDA FINAL
KRIYA SHARIR
(Physiology)

Paper- I (Dosa-Dhātu-Mala Vijñāna)

Contribution of different Ayurveda Samhita in Kriya Sharir

- Theory of Pancamahābhūta
- Principle of Loka-Purusa Sāmya
- Importance of Sāmānya - Viśesa principle.
- Different views on the composition of Purusa and the importance of Cikitsya Purusa.
- Importance of Gurvādi Guna in Ayurveda.
- General description of Tridosa theory
- Mutual relationship between Triguna-Tridosa-Pancamahābhūta-Indriya.
- Mutual relationship between Rtu-Dosa-Rasa-Guna.
- Biological rhythms of Tridosa on the basis of Day-Night-Age-Season and Food intake.
- Role of Dosa in the formation of Prakrti of an individual.
- Role of Dosa in maintaining health.
- Vāta Dosa: General locations (Sthāna), general attributes (Guna) and general functions (Sāmānya Karma). Five subdivisions of Vāta with their specific locations, specific properties, and specific functions (Prāna, Udāna, Samāna, Vyāna, Apāna)
- Pitta Dosa: General locations (Sthāna), general attributes (Guna) and general functions (Sāmānya Karma). Five subdivisions of Pitta with their specific locations, specific properties, and specific functions (Pācaka, Ranjaka, Ālocaka, Bhrājaka, Sādhaka). Similarities and differences between Agni and Pitta.
- Kapha Dosa: General locations (Sthāna), general attributes (Guna) and general functions (Karma) of Kapha. Five subdivisions of Kapha with their specific locations, specific properties, and specific functions (Bodhaka, Avalambaka, Kledaka, Tarpaka, Ślesaka).
- Applied physiology of Tridosa principle: Kriyākāla, Dosa Vrddhi-Dosa Ksaya.
- Dhātu Posana: Process of nourishment of Dhātu. Description of various theories of Dhātu Posana (Ksīra-Dadhi, Kedārī-Kulya, Khale Kapota etc).
- Dhātu: General introduction and definition of Dhātu. Formation, Definition (Nirukti), Distribution, Attributes, quantity, classification, Pāñcabhautika composition and

Functions of all seven Dhātus in detail: Rasa, Rakta, Māmsa, Meda, Asthi, Majjā, Śukra.

- Applied physiology of Dhātu: Manifestations of Ksaya and Vriddhi of each Dhātu. Description of Dhātu Pradosaja Vikāra.
- Description of Āśraya and Āśrayī kind of relationship between Dosa and Dhātu.
- Description of the characteristic features of Astavidha Sāra. Description of Rasavaha, Raktavaha, Māmsavaha, Medovaha, Asthivaha, Majjāvaha and Śukravaha Srotāmsi.
- Ojas: Definition, locations, synonyms, Formation, Distribution, Properties, Quantity, Classification and Functions of Ojas. Description of Vyādhiksamitva. Bala Vrddhikara

Bhāva. Classification of Bala. Relation between Ślesmā, Bala and Ojas.

- Applied physiology of Ojas: Etiological factors and manifestations of Ojaksaya,

Visramsa and Vyāpat. Physiological and clinical significance of Ojas.

- Upadhātu: General introduction and Definition of the term 'Upadhātu'. Formation, Nourishment, Quantity, Properties, Distribution and functions of each Upadhātu. • Stanya: Characteristic features and methods of assessing Śuddha and Dūsita Stanya, Manifestations of Vrddhi and Ksaya of Stanya.
- Ārtava: Characteristic features of Śuddha and Dūsita Ārtava. Differences between Raja and Ārtava, physiology of Ārtavavaha Srotāmsi.
- Study of Tvak
- Physiology of Mala - Definition of the term 'Mala'. Definition, Formation, Properties, Quantity and Functions of Purīsa, Mutra. Manifestations of Vrddhi and Kshaya of

Purīsa and Mūtra.

- Sveda – Definition, Formation, Properties, Quantity and Functions of Svedavaha Srotāmsi. Formation of Sveda. Manifestations of Vrddhi and Ksaya of Sveda.
- Dhātumala – Definition, Formation, properties, Quantity, Classification and Functions of each Dhātumala .

Paper-II - Prakrti- Sattva Vijñāna

- Deha-Prakrti: Various definitions and synonyms for the term 'Prakrti'. Factors influencing the Prakrti. Classification of Deha-Prakrti. Characteristic features of the individuals belonging to each kind of Deha-Prakti. Recent advances in understanding the Prakrti.
- Pancajnanendriya: Physiological description of Pancajnanendriya and physiology of perception of Śabda, Sparśa, Rūpa, Rasa, Gandha. Indriya-panca-pancaka; Physiological description of Karmendriya.
- Manas – Definition, location (sthana), Properties, Functions and Objects of Manas.

- Ātmā – Definition, Properties of Ātmā. Difference between Paramātmā and Jīvātmā; Characteristic features of Ātmā.
- Buddhi – Location, Types, Functions of Buddhi; Physiology of Dhī, Dhrti and Smrti.
- Nidrā – Definition of Nidrā, Classification of Nidrā. Tandra, physiological and clinical significance of Nidra; Svapnotpatti and Svapnabheda.
- Physiology of special senses. Intelligence, Memory, Learning and Motivation.
- Physiology of sleep.
- Physiology of speech and articulation;
- Physiology of Pain and temperature.

Paper-III - Kosthanga Kriya Vijñāna

- Āhāra: Definition and significance of Āhāra. Classification of Āhāra. Āhāra-vidhividhāna. Asta āhāravidhi viśesāyatana, Āhāraparināmakara bhāva.
- Āhārpāchana: Āhāra Pāka Prakriyā, Description of Annavaha Srotās. Description of Avasthāpāka and Nishthapaka. Role of dosha in Āhārapāka. Sāra and Kitta

Vibhajana. Absorption of Sāra. Utpatti and Udieeran of Vāta-Pitta-Kapha.

- Definition of the term Kostha. Physiological classification of Kostha and the characteristics of each kind of Kostha.
- Agni: Description of the importance of Agni. Classification of Agni. Locations, properties and functions of Jātharāgni, Bhūtāgni, and Dhātvagni.
- Applied physiology of Agni in Kriyā Śārīra and Cikitsā.
- Description of the aetiology and features of Annavaha Srotodusti. Applied physiology of Annavaha Srotās: Arocaka, Ajīrna, Atīsāra, Grahanī, Chardi, Parināma Śūla Agnimāndya.
- Description of the process of digestion of fats, carbohydrates and proteins in human gastrointestinal tract. Different digestive juices, their enzymes and their mechanisms of action. Functions of Salivary glands, Stomach, Pancreas, Small intestine, Liver and large intestine in the process of digestion and absorption.
- Movements of the gut (deglutition, peristalsis, defecation etc.) and their control. Role of neuro-endocrine mechanisms in the process of digestion and absorption. Enteric nervous system.
- Applied physiology of gastrointestinal tract: Vomiting, Diarrhoea, Malabsorption etc.
- Recent understandings related to the gut microbiota and their role in health and disease.
- Introduction to biochemical structure, properties and classification of proteins, fats and carbohydrates.

- Description of the processes involved in the metabolism of proteins, fats and carbohydrates.
- Vitamins: sources, daily requirement and functions. Physiological basis of signs and symptoms of hypo and hyper-vitaminosis.

Paper-IV - Modern Physiology and its applied aspect

Physiology of Neuro-Immune-Endocrine Mechanisms:

- Physiology of Nervous System. General introduction to nervous system: neurons, mechanism of propagation of nerve impulse.
- Study of CNS, PNS and ANS. Sensory and motor functions of nervous system. Functions of different parts of brain and spinal cord, Hypothalmus and limbic system
- Physiology of Endocrine system. Classification and characteristics of different hormones. Description of hormones secreted by Hypothalamus, Pituitary gland, Thyroid gland, Parathyroid glands, Pancreas, Adrenal glands and their physiological effects. Effects of hypo and hyper-secretion of various hormones.
- Male and female reproductive physiology. Spermatogenesis and oogenesis. Hormonal regulation of uterine and ovarian cycles. Physiology of pregnancy and lactation. Parturition.
- Adipose tissue and its Function. Circulating lipids. Description of lipoproteins like VLDL, LDL and HDL and their composition.
- Physiology of immune system. Definition and classification of immunity: Innate, acquired and artificial. Mechanisms involved in humoral and cell mediated immunity.

Cardiovascular physiology, Respiratory physiology and Blood:

- Physiology of Cardio-Vascular system: Functional anatomy of cardiovascular system. Cardiac cycle. Heart sounds. Regulation of cardiac output and venous return. Physiological basis of ECG. Heart-rate and its regulation. Arterial pulse. Systemic arterial blood pressure and its control. Regional circulations. Physiology of lymphatic circulation.
- Physiology of Respiratory system: Functional anatomy of respiratory system. Ventilation. Mechanism of respiration. Exchange and transportation of gases. Neural and chemical control of respiration. Spirometry and lung function tests. Artificial respiration.
- Functions of Haemopoetic system: Composition and functions of blood and blood cells. Haemopoiesis- (stages and development of RBCs, WBCs and platelets); Introduction to bone marrow: composition and functions of bone marrow. Structure and functions of haemoglobin, mechanism of blood clotting, study of platelets. physiological basis of blood groups. Principles of blood transfusion, plasma proteins- synthesis and functions. Applied physiology: Anaemia, Jaundice.

Musculoskeletal Physiology:

- Physiology of muscles. Classification of muscles. Electrical and mechanical properties of Cardiac, skeletal and smooth muscles.

Physiology of Excretion:

- Physiology of excretion. Functional anatomy of urinary tract. Functions of kidneys. Mechanism of formation of urine. Control of micturition. Renal function tests.
- Structure and functions of skin, sweat glands and sebaceous glands.

Learners should be well versed with the following instruments-

- Physiograph, Computerised spirometry, Biochemical Analyzer, Pulse oxymeter, Elisa Reader, Hematology Analyzer, Tread mill

Bridge areas including recent advances:

- Recent studies in biorhythms.
- Recent advances in Neuro-Immune-Endocrine physiology.
- Recent advances in stem cell research

PRACTICAL

Ayurvedic practicals

- Assessment of Prakrti
- Assessment of Sāra
- Assessment of Dosa Vrddhi Ksaya Laksana
- Assessment of Dhātu Vrddhi – Ksaya Laksana
- Assessment of Agni
- Assessment of Kostha
- Assessment of Śarīra Bala through Vyāyāma Śakti
- Mūtra Parīksa
- Nādī Parīksā
- Anguli Pramāna
- Assessment of Sātmya

Hematology

- Use and care of Compound microscope
- Histological study of different organs
- Hemoglobin estimation
- Total RBC count
- Total WBC count
- Differential leukocyte count
- Packed cell volume (PCV)
- ESR
- Bleeding time
- Clotting time
- Blood grouping and Rh typing

Urine examination

Physical examination

- Specific gravity and reaction of urine
- Detecting the presence of Albumin in urine
- Detecting the presence of Sugar in urine
- Detecting the presence of Ketone bodies in urine
- Detecting the presence of Bile salts and bile pigments in urine

Cardio-Vascular system

- Clinical methods of examining cardiovascular system
- Examination of Arterial Pulse
- Arterial blood pressure measurement: Effect of posture, exercise and cold pressor test on Blood Pressure
- ECG recording and its interpretation
- Heart Sounds

Respiratory system

- Clinical examination of Respiratory System
- Lung Function Tests including Spirometry

Nervous System

- Clinical examination of nervous system
- Examination of higher mental functions
- Examination of cranial nerves
- Examination of reflexes
- Examination of sensory functions
- Examination of motor functions
- Examination of Autonomic Nervous System
- EEG recording (Demonstration)

Reference Books

- Ayurvediya Kriyasharir - Ranjit rai Desai
- Kayachikitsa Parichaya - C. Dwarikanath
- Prakrit Agni Vigyan - C. Dwarikanath
- Sharir Kriya Vigyan - Shiv Charan Dhyani
- Abhinava Sharir Kriya Vigyana - Acharya Priyavrata Sharma
- Dosha Dhatu Mala Vigyana - Shankar Gangadhar Vaidya
- Prakrita Dosha Vigyana - Acharya Niranjana Dev
- Tridosha Vigyana - Shri Upendranath Das
- Sharira Tatva Darshana - Hirlekar Shastri
- Prakrita Agni Vigyana - Niranjana Dev
- Deha Dhatvagni Vigyana - Vd. Pt. Haridatt Shastri
- Sharir Kriya Vigyana (Part 1-2) - Acharya Purnchandra Jain
- Sharir Kriya Vigyana - Shri Moreshwar Dutt. Vd.
- Sharira Kriya Vijnana (Part 1 and 2) – Nandini Dhargalkar
- Dosha Dhatu Mala Vigyana - Basant Kumar Shrimal
- Abhinava Sharir Kriya Vigyana - Dr. Shiv Kumar Gaur

- Pragyogik Kriya Sharir - Acharya P.C. Jain
- Kaya Chikitsa Parichaya - Dr. C. Dwarkanath
- Concept of Agni - Vd. Bhagwan Das
- Purush Vichaya - Acharya V.J. Thakar
- Kriya Sharir - Prof. Yogesh Chandra Mishra

- Sharir Kriya Vigyana - Prof. Jayaram Yadav &Dr. Sunil Verma.
- Basic Principles of Kriya-Sharir

(A treatise on Ayurvedic Physiology) - Dr. Srikant Kumar Panda

- Sharir Kriya – Part I & Part II – Dr. Ranade, Dr. Deshpande & Dr. Chobhe
- Human Physiology in Ayurveda - Dr Kishor Patwardhan
- Sharirkriya Vignyan Practical Hand Book – Dr.Ranade, Dr.Chobhe, Dr. Deshpande
- Sharir Kriya Part 1 – Dr.R.R.Deshapande, Dr.Wavhal
- Sharir Kriya Part 2 – Dr.R.R.Deshapande, Dr.Wavhal
- Textbook of Physiology - Gyton & Hall
- Review of medical physiology – William Ganong
- Essentials Of Medical Physiology - Sembulingam, K.
- Concise Medical Physiology - Chaudhari, Sujit. K.
- Fundamental of Anatomy & Physiology - Martini
- Principals of Anatomy & Physiology - Tortora & Grabowski
- Human Physiology - Richards, Pocock
- Samson Wrights Applied Physiology, Keele, Neil, joels
- Brainstem Control of Wakefulness And Sleep- Steriade, Mirce
- An Introduction to Human Physiology - Green, J.h.
- Ancient Indian Medicine - Kutumbiah P.
- Biographical History of Indian Medicine - Srikanthamurthy KR
- Ayurveda Kriya Sharira - Yogesh Chandra Mishra
- Textbook of Medical Physiology - Indu Khurana
- Tridosha Theory - Subrahmanya Shastri
- Statistics in Medicine - K. Syamalan

Important journals to refer:

1. Advances in Physiology Education
2. Academic Medicine
3. Indian journal of Physiology and Pharmacology
4. Journal of Ayurveda and Integrative Medicine
5. Evidence-based Complementary and Alternative Medicine
6. AYU
7. All journals of American Physiological Society
8. Journal of Physiology

Important research papers to refer:

1. Hong KW, Oh B. Overview of personalized medicine in the disease genomic era. BMB Rep. 2010 Oct;43(10):643-8.

2. Prasher B, Negi S, Aggarwal S, Mandal AK, Sethi TP, Deshmukh SR, Purohit SG, Sengupta S, Khanna S, Mohammad F, Garg G, Brahmachari SK; Indian Genome Variation Consortium, Mukerji M. Whole genome expression and biochemical correlates of extreme constitutional types defined in Ayurveda. J Transl Med. 2008 Sep 9;6:48.

3. Patwardhan B, Bodeker G. Ayurvedic genomics: establishing a genetic basis for mind-body typologies. J Altern Complement Med. 2008 Jun;14(5):571-6. Review.

PubMed PMID: 18564959.

4. Bhushan P, Kalpana J, Arvind C. Classification of human population based on HLA gene polymorphism and the concept of Prakriti in Ayurveda. J Altern Complement Med. 2005 Apr;11(2):349-53.

5. Ghodke Y, Joshi K, Patwardhan B. Traditional Medicine to Modern

Pharmacogenomics: Ayurveda Prakriti Type and CYP2C19 Gene Polymorphism

Associated with the Metabolic Variability. Evid Based Complement Alternat Med. 2009 Dec 16. [Epub ahead of print]

6. Aggarwal S, Negi S, Jha P, Singh PK, Stobdan T, Pasha MA, Ghosh S, Agrawal A; Indian Genome Variation Consortium, Prasher B, Mukerji M. EGLN1 involvement in high-altitude adaptation revealed through genetic analysis of extreme constitution types defined in Ayurveda. Proc Natl Acad Sci U S A. 2010 Nov 2;107(44):18961-6. Epub 2010 Oct 18.

7. Tav Pritesh Sethi, Bhavana Prasher and Mitali Mukerji. Ayurgenomics: A New Way of Threading Molecular Variability for Stratified Medicine. ACS Chemical Biology.2011(6):875-880

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9. Licinio J, Frost P. The neuroimmune-endocrine axis: pathophysiological implications for the central nervous system cytokines and hypothalamus-pituitary-adrenal hormone dynamics. Braz J Med Biol Res. 2000 Oct;33(10):1141-8.

10. Turrin NP, Rivest S. Unraveling the molecular details involved in the intimate link between the immune and neuroendocrine systems. Exp Biol Med (Maywood). 2004 Nov;229(10):996-1006

11. Sewlall S, Pillay V, Danckwerts MP, Choonara YE, Ndesendo VM, du Toit LC. A timely review of state-of-the-art chronopharmaceuticals synchronized with biological rhythms. Curr Drug Deliv. 2010 Dec;7(5):370-88.

12. Ohdo S. Chronopharmaceutics: pharmaceutics focused on biological rhythm. Biol Pharm Bull. 2010 Feb;33(2):159-67

13. Humes HD. Stem cells: the next therapeutic frontier. Trans Am Clin Climatol Assoc. 2005;116:167-83; discussion 183-4.

14. Bianco P, Robey PG. Stem cells in tissue engineering. Nature. 2001 Nov 1;414(6859):118-21

15. Bhattacharya J. The Knowledge of Anatomy and Health in Ayurveda and Modern Medicine: Colonial Confrontation and Its Outcome

16. Wujastyk D. Interpreting the image of the human body in premodern India. Int J Hindu Studies 13: 189–228, 2009.

17. Kristina Harris, Amira Kassis, Geneviève Major, Chieh J. Chou. Is the Gut Microbiota a New Factor Contributing to Obesity and Its Metabolic Disorders? J Obes. 2012; 2012: 87915

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