PhD Entrance syllabus of Ayurvedic Pharmacy

Note: The curriculum contains the course content of B.Pharmacy (Ayurveda) and M.Pharmacy (Ayurveda)

1. Rasa Shastra

- Fundamental principles, paribhashiksabda and history of Rasashastra,
- Yantras, Puta, Concept of Bhasma and Bhasmaparikshavidhi
- Detailed ancient and contemporary knowledge of Parada and its compounds with reference to source, occurrence, physico-chemical characterization, graahyaagraahyatva, Parada dosha, Parada gati, Parada shodhan, Study of Ashtasanskara,
- Detailed ancient & contemporary knowledge of Maharasa, Uparasa, Sadharana rasa, Dhatu, Upadhatu, Ratna, Uparatna, Visha, Upavisha, Sudha varga, Lavanavarga, Ksharavarga, Sikatavarga and other miscellaneous drugs used in Rasashastra.
- Detailed knowledge of manufacturing, standardization and quality control of Kharaliya rasa, Parpati, Kupipakvarasayana and Pottalikalpana

2. Bhaishajya Kalpana

- History and Chronological evolution of Bhaishajya Kalpana, fundamental principles of Bhaishajya Kalpana.
- Detailed knowledge of manufacturing, standardization, quality control, pharmacopeial standards, storage, shelf life and development of innovative technology with Standard Manufacturing Operating Procedures of following dosage forms –
    a. Panchavidha Kashaya, Churna, Rasakriya, Ghana, Avaleha, Pramathya, Mantha, Panaka, Sarkara, Kshirapaka, Ushnodaka, Aushadha Siddha Udaka, Sadangodaka, Tandulodaka, Laksharasa, Arka, Satva, Kshara, Lavana, Masi, Gutika, Vatika, Modaka, Guggulu and Varti etc.
    b. Sneha Kalpana
    c. Sandhanakalpana: Madya varga and Shuktavarga.

d. BahyaPrayogartha Kalpana: Lepa, Upanaha, Udvartan, Avachurnana/ Avadhulana, Abhyanga, Dhupana, Malahara.
e. Mukha Kalpana, Nasaya Kalpana, Netra Kalpana, Basti Kalpana

3. **Dravyaguna Vigyan**:

- Definition, history and classification of Dravyagunavigyan
- Dravya: definition, panchbhautic composition, classification, superiority
- Components of Rasa-panchak and their effect on Dosha, Dhatu and Mala
- Jangamdravya (synonyms, appearance, properties, dose, formulations): kasturi, gorochan, praval, mukta, shankha, sambook, varatika, sukti, mrigshring
- Varga: jalavarga, madhuvarga, mamsavarga, tailavarga, dugdhavarga
- Controversial dravya: factors responsible for controversy, steps to resolve controversy, study of controversial dravya: rasna, pashanbhed, brahmi, amlavetas, bala, shankhapushpi, murva, nagkesar, trivrit
- Ingredients, part used and uses of Mishrakvarga (triphala, trikatu, trimada, trijatak, chaturjatak, chaturbeej, madhutrayee, trikarshika, laghupanchmool, brihatpanchmool, panchpallav, panchvalkal, panchkshirivriksha, vallipanchmool, trinapanchmool, madhyampanchmool, kantakpanchmool, jeevanpanchmool, panchtikta, panchkola, shadushna, amlapanchak, mahapanchvisha, upavisha, panchlavana, kshardwaya)
- Properties of Medicinal plants (kutaj, ashoka, lodhra, khatmee, lavang, champak, chandan, hingu, kachanar, arjuna, karpoor, karvir, kirat-tikta, karkatshringi, karanj, bhringraj, aragvadha, bakuchi, bhallatak, haridra, khadira, brahmi, mandookparni, bhumi-amalaki, aswatha, ashwagandha, dhatura, draksha, dhataki, majuphala, kapikachu, arka, katuka, kumari, trishnanigharan: dhaniyak, gunja, arishtak, apamarg, guggulu, nirgundi, asthishrinkhla, daruharidra, gorakshamajja, varun, varahikand, vidari, bibhitaki, vasa, yastimadhu, chitrak, marich, ela, raktachandan, jatiphala, parnayavani, chakramard, madayantika, kantakari, narikela, nilini, tila, nimbook, jyotismati, ashwagol, gokshur, ikshu, munja, punarnava, sarpagandha, darbha, haritaki, manjistha, chandrasura, kokilaksha, shatavari, lajjalu, swarnpatri, trivrit, vacha, chavya, sunthi, danti, katurohini, rason, palandu, misi, ervaru, kulatha)

4. **Pharmacognosy**:

- Introduction, classification, extraction, isolation and primary phytochemical screening of primary and secondary metabolites(Carbohydrates, Alkaloids, Glycosides, Tannins, Volatile oil, Fixed oil, Resin, Saponins)
- Factors affecting quality of herbal drugs, Bio-availability enhancers
- Nutraceuticals
- Standardization of herbal drugs
- Tissue culture, Plant growth regulators
- Marine Pharmacognosy: Introduction and classification
- Recent advancements in the following categories of ayurvedic drugs: Rasayana drugs,hepatoprotective drugs, anti-fertility drugs, anti-cancer drugs, anti-inflammatory drugs, anti-diabetic drugs, drugs used in skin diseases, biological allergens, hallucinogens, poisonous plants used in Ayurveda

5. Quality Control&Legislations related to Ayurvedic Pharmacy:

- Ayurvedic formulations: classification, stability, shelf life, introduction to excipients used in formulations, heavy metal limit, microbiological count, bacterial count, limit of radioactive elements in herbal formulations, labelling issues of ayurvedic formulations
- Analytical profiles of certain ayurvedic formulations: churna, taila, ghrita, avaleha, asava and arista, bhasmas, pisti, mandoor, vati, kharaliyarasayana, kupipakwarasayana, pottalikalpana, parpatikalpana
- Quality Control and Quality Assurance: quality control and quality assurance issues related to ayurvedic drugs Standardization and recent advancements of ayurvedic and herbal products: study of physicochemical, biological and toxicological parameters, use of marker compounds in standardization
- GMP guidelines for ayurvedic drugs, effect of GMP on finished product standardization and marketing, introduction to ayurvedic and different herbal pharmacopoeias
- Basic knowledge of Drug & Cosmetic Act 1940, Magic Remedies, Poisons Act, Shops and Establishment Act, Animal Cruelty Act, Patent Act, Narcotic and Psychotropic Act, Factories Act

6. Modern Analytical techniques:

- UV-Visible spectrophotometry: introduction to absorption spectroscopy, principle of UV-Visible spectrometry and Beer Lambert law, Deviation of Beer Lambert law, types of absorption bands, concepts of chromophore and auxochrome, types of shifts in UV, effects of solvents and auxochromes on absorption, Woodward–Fieser rule, application of UV- visible spectrophotometry
- Infrared spectroscopy: introduction of infrared spectroscopy, principle and instrumentation, sampling techniques in IR spectroscopy, modes of molecular vibrations, factors influencing vibrational frequencies, interpretation of infrared spectrum, FTIR, Applications of ATR spectroscopy
- Mass spectroscopy: basic principles of mass spectroscopy, brief outline of instrumentation, different ionization techniques, types of ions and peaks, fragmentation process and relationship of fragmentation characteristics to molecular structure and functional groups, applications of mass spectroscopy
- Nuclear magnetic resonance spectroscopy: basic principle and instrumentation of proton NMR, chemical shifts, factors effecting chemical shifts, shielding and deshielding, spin spin coupling, spin spin splitting, applications of proton NMR, basic principle and instrumentation of C 13 NMR, applications of C 13 NMR
- Chromatographic techniques: introduction to liquid chromatography, types of liquid chromatography, principle, instrumentation and applications of column chromatography HPLC and HPTLC, Gas chromatography: Introduction, fundamentals, instrumentation, columns: preparation and operation, detection, dramatization, Thermoanalytical techniques: introduction to thermal methods, principle, instrumentation, applications, differential scanning calorimetry, differential thermal analysis, thermogravimetry
- Electron microscopy: Introduction to microscopy, principle, instrumentation and applications of scanning electron microscopy, principle, instrumentation and applications of transmission electron microscopy

7. <u>Pharmacology:</u>

- General pharmacological, Pharmacokinetic and Pharmacodynamic principles
- Pharmacology of Peripheral Nervous system: neuro-humoral transmission (autonomic and somatic), parasympathomimetic drugs, parasympatholytic drugs, sympathomimetic drugs, sympatholytic drugs

- Autacoids and their antagonists: histamine, antihistaminics, serotonin, antiserotonergic drugs, prostaglandins, thromboxanes and leukotrienes, Antiinflammatory and antirheumatic drugs: pharmacology of nonsteroidal anti-inflammatory drugs, drugs used for rheumatoid arthritis
- Narcotic analgesics: pharmacology of narcotic analgesics, opioid receptors, pharmacology of opioid antagonists, Drugs acting on central nervous system: general anaesthetics, sedative-hypnotic agents, antidepressants, antianxiety drugs, anti-epileptic drugs, antiparkinsonian drugs
- Pharmacology of endocrine system: thyroid hormones, antithyroid drugs, insulin, oral hypoglycemic agents, corticosteroids Unit VI Drugs acting on respiratory system: anti- asthmatic agents, mucolytics, nasal decongestant agents, anti- tussives and expectorants, respiratory stimulant agents
- Drugs acting on Cardiovascular drugs, Urinary system, GIT, Respiratory system
- Chemotherapy, Chemotherapy for malignancy, Immunopharmacology

8. **Pharmaceutics and Pharmaceutical Engineering**:
    - Definition, classification, advantages, disadvantages, manufacturing, labelling and packaging requirements of following dosage forms: Powders, Liquid dosage forms (solution, syrups, elixirs, gargles, liniments, lotions, mouthwashes, ear drops, eye drops etc), Suspension, Emulsion, Ophthalmic products
    - Definition, classification, advantages, disadvantages, manufacturing, labelling and packaging requirements of following dosage forms: Semisolid products (ointment, cream, lotion etc)
    - Pharmaceutical Aerosols, Suppositories, Cosmetic preparations
    - Preformation, Stability studies, Incompatibility, Sustained Release Drug Delivery System, Novel Drug Delivery System
    - Size reduction, Size separation, Mixing, Extraction, Evaporation, Drying

9. Basic Principle of Ayurveda:

- Definition and aim of Ayurveda and Health
- Fundamental principles of Ayurveda, Astanga Ayurveda
- Life-style according to Ayurveda: Dincharya, Ratricharya, Ritucharya

- Concept of bheshaja, pharmacology, pharmaceuticals and pharmacognosy according to Ayurveda
- Brihatrayee, Laghutrayee
- Methods of diagnosis in ayurveda (their utility and application in pharmacy): trividpariksha, ashtvidpariksha, dasvidpariksha
- Padarth, Guna, Dravya, Samanya, vishesh, samvaya: definition, introduction, etymology, classification
- Dosha, Dhatu, Mala: introduction, etymology, definition, classification, panchabhautik composition, importance
- Yogasana: introduction, benefits, classification of asana