D.Y.Patil Deemed to be University School of Ayurveda, Nerul Navi Mumbai.

Syllabus of Final MD

5. RASA SHAASTRA AND BHAISHAJYA KALPANA
(Iatrochemistry & Pharmaceuticals Science)

Paper I Rasa Shastra

Part A

History and Chronological evolution of Rasashastra, concept of Raseshwara darshan. Fundamental Principles of Rasashastra Technical terminologies (Paribhasha) used in Rasa shastra.

Detailed knowledge of ancient and contemporary Yantropakarana and their accessories used in aushadhikaran and their contemporary modification such as yantras, mushas, putas, Koshthis, bhrashtris, muffle furnaces and other heating appliances, ovens, driers etc. used in manufacturing of Rasaushadhis in small scale and large scale along with their applications.

Study of Samskara, Role of agni (Heat), jala and other dravas (water and other processing liquids), kala (Time span), paatra (container) etc. and their significance in aushadhikarana.

Concept of Bhavana, study of Mardana and its significance and knowledge of ancient and contemporary grinding techniques.


Detailed knowledge of Satva and Druti, Satva shodhan, mrudukaran and Maran of Satva, its significance, in relation to therapeutic efficacy of dravya under process.

Concept of Pratinidhi dravya and discussion on controversial drugs.
PART – B

Detailed ancient and contemporary knowledge of Parada and its compounds with reference to source, occurrence, physico-chemical characterization, graahya agraahyatva, Parada dosha, Parada gati, Parada shodhan, Study of Ashta sanskara, ashtadasha sanskara etc., Hingulottha Parada. Concept of Parada jaran, moorcchana, bandhan, pakshaccheda and marana etc. Therapeutic properties and uses of Parada.

Detailed ancient & contemporary knowledge with Geochemical / mineralogical / biological identification, source, occurrence, physico-chemical characterization, graahya-agraahyatva, Shodhan Maranadi vidhi and therapeutic properties and uses of dravyas etc. included in Maharasa, Uparasa, Sadharana rasa, Dhatu, Upadhatu, Ratna, Uparatna, Visha, Upavisha, Sudha varga, Lavana varga, Kshara varga, Sikata varga and other miscellaneous drugs used in Rasashastra.

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


**Dravaka** - Shankha Dravaka

**Pishti** - Praval pishti, Manikya Pishti, Mukta pishti, Jahara mohara pishti, Trinakanta mani pishti etc. Detailed knowledge of manufacturing, storage, shelf life, pharmacopeial standards, therapeutic efficacy, dose, anupana and development of technology with Standard Operating Procedures of processing, standardization and quality control of Kharaliya rasa, Parpati, Kupipakva rasa and Pottali rasa. Study of classical texts with respective commentaries and special emphasis on Rasarnava, Rasahridaya tantra, Rasa Ratna Samucchaya, Rasendra Chintamani, Rasendra Chudamani, Rasa Ratnakara, Rasadhyaya, Rasa

**Paper II Bhaishajya Kalpana**

**Part A**

History and Chronological evolution of Bhaishajya Kalpana, Concept of Bhashaja and Aushadhi, fundamental principles of Bhaishajya Kalpana. Technical terminologies (Paribhasha) used in Bhaishajya Kalpana.

Classical and Contemporary concepts of Collection, storage, Saviryata Avadhi and preservation methods of different fresh and dry Aushadhi dravyas and their graahya agraahyatva.

Detailed knowledge of routes of drug administration, Aushadha matra, Anupana, Sahapana, Aushadha Sevana Kala, Kala Avadhi, Pathya, Apathya (Posology).

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


Kritanna and Bhaishaja Siddha Anna Kalpana, Aharopayogi varga, concept of medicinal and functional food, dietary supplements and nutraceuticals etc.

Sandhana kalpana: Madya varga and Shukta varga. Asava yoni. Alcoholic and acidic fermentation. Sandhana kalpa karmukata (Pharmacokinetics and

Bahya Prayogartha Kalpana: Lepa, Upanaha, Udvartan, Avachurnana / Avadhulana, Abhyanga, Dhupana, Malahara.

Mukha, Karna, Nasa, Netropacharartha Kalpana:

Basti Kalpana: Basti Yantra Nirmana, Types of basti. Anuvasana and Asthapanas basti. Karma, kala and yoga basti etc. Basti Kalpa (Madhutailika, Piccha basti etc.), Comparison of Asthapanas and Anuvasana basti with evacuation and retention enema.

**Part B**

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

Methods of Expression and Extraction: Maceration, percolation, distillation, infusion and decoction.

**Liquids:** Clarified liquid, syrup, elixir, filtration techniques

**Solid dosage Forms:** Powders: Size reduction, separation techniques, particle sizedetermination, principles of mixing. **Tablets:** Methods of tableting, suppositories, pessaries and capsules, sustained release dosage forms.

**Semisolid dosage forms,** emulsions, suspensions, creams and ointments, sterilization of ophthalmic preparations.

An introduction to various cosmetic preparations.

Drying, open and closed air drying, freeze drying, vacuum drying and other drying methods pharmaceutical excipients.

Study of classical texts with special emphasis on Chakradatta, Sharangadhara Samhita, Bhaishajya Ratnavali, Bhava Prakasha, Yogaratnakara, relevant portions of Brihatrayi, Ayurvedic Pharmacopeia of India, Ayurvedic Formulary of India.
Paper III Rasa Chikitsa & Aushadha Yoga Vidyana

PART- A


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


Kupipakva Rasa: Rasa Sindura, Makaradhwaja, Sidha makaradhwaja, Samirapannaga Swarnavanga, Malla sindura, Rasa karpura, Rasa pushpa, Manikya Rasa.

Parpati Rasa: Rasa Parpati, Loha Parpati, Tamra Parpati, Suwarna Parpati, Gagana Parpati, Vijay Parpati, Panchamrit Parpati, Shwet Parpati, Bola Parpati
Pottali Rasa: Rasagarbha pottali, Hemagarbha pottali, Mallagarbha pottali, Hiranyakagarbha pottali, Shankagarbha pottali, Lokanatha rasa, Mriganka Pottali

Loha evam Mandura Kalpa: Ayaskriti, Loha Rasayana, Amla pittantaka loha, Chandanadi loha, Dhatri loha, Navayasa loha, Putpakva vishama jvarantaka loha, Shilajatwadi loha, Tapyadi loha, Saptamrita loha, Dhatri loha Amritasara Loha, Shankaramat loha, Pradarantaka loha, Rohitaka loha, Punarnava Mandura, Shatavari Mandura, Tara Mandura, Triphala Mandura, Mandura Vataka etc.

Part B

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

Panchavidha Kashayas and their Upakalpa: Ardraka swarasa, Tulasi swarasa, Vasa putapaka swarasa, Nimba kalka, Rasona kalka, Kulattha Kwath, Punarnavasthaka kwatha, Rasna saptaka kwatha, Dhanyak hima, Sarivadi hima, Panchakola phanta, Tandulodaka, Mustadi pramathya, Kharjuradi mantha, Shadanga paniya, Laksha rasa, Arjuna kshirapaka, Rasona kshirapaka, Chincha panaka, Candana panaka, Banapsha sharkara, Nimbu sharkara, Amrita satva, Ardraka satva, Ajamoda arka, Yavanyadi arka

Kritanna and Bheshaja Siddha Ahara Kalpana: Yavagu, (Krita and Akrita), Ashtaguna manda, Laja manda, Peya, Vilepi, Krishara, Yusha, Mudga yusha, Kulattha yusha, Saptamushtika yusha, Khada, Kambalika, Raga, Shadava, Mamsaras, Veshavara, Dadhi, Katvar Dadhi, Dadhi Mastu, Takra, Ghola, Udasvita, Mathita, Chhacchika etc.

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

**Guggulu:** Yogaraja Guggulu, Maha yogaraja Guggulu, Trayodashanga
Guggulu, Kanchanara Guggulu, Rasnadi Guggulu, Triphala Guggulu, Simhanada
Guggulu, Gokshuradi Guggulu, Kaishora Guggulu, Panchatikta Guggulu, Amritadi

**Sneha Kalpa**

**Sneha Moorchnaha** - Ghrita Murchana, Taila Murchhana

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

**Siddha Taila** - Maha Narayana Taila, Maha Masha Taila, Bala Taila, Nirgundi Taila, Shadbindu Taila, Vishagarbha Taila, Sahacharadi Taila, Jatyadi Taila, Apamarga Kshara Taila, Tuvaraka Taila, Kshirabala Taila (Avarita), Lakshadi Taila, Anu Taila, Kumkumadi Taila, Hingutriguna Taila, Kottumchukadi Taila, Prasarinyadi Taila,

Dhanvantari Taila, Balashwagandhadi Taila, Balaguduchyadi Taila, Nilibhringyadi Taila, Brihadavadi Taila, Irimedadi Taila, Chandanadi Taila, Panchaguna taila, Arka taila, Pinda Taila, Kasisadya Taila


**viii. Sandhana Kalpa:** Lodhrasava, Kumaryasava, Ushirasava, Chandanasava, Kanakasava, Sarivadyasava, Pippalyasava, Lohasava, Vasakasava, Kutajarishta, Draksharishta, Raktamitrarka, Dashamularishta, Abhayarishta,


PAPER – IV Pharmacology and Pharmacy Management

PART - A

General Pharmacology:
Routes of drug administration
Factors modifying drug effect, Bioavailability and Bioequivalence, drug interactions, adverse drug reaction and drug toxicity
d) Preclinical evaluation: experimental pharmacology [bioassay, in vitro, in vivo, cell line studies] animal ethics. Introduction to OECD Guidelines & CPCSEA. (*The point ‘Animal Ethics’ is elaborated for clear understanding.)
Elemental constituents of human body and its physiological importance.
Deficiencies and excess of various elements (micro-nutrients).
Toxicity of heavy metals and chelation therapy.
Knowledge of toxicity and pharmacological activities of herbo-mineral compounds.
Detailed Knowledge of Pharmacovigilance – National and International Scenario.
Pharmacovigilance of Ayurvedic Drugs

**Part B**


**Practicals:-**

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

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

Ten days posting in R & D / Production unit in GMP certified Ayurvedic Pharmacy. Minimum attendance in three National Conferences within three academic years. Minmum 10 clinical cases using different dosage forms are to be studied and recorded for efficacy and ADRs (if any).

Minimum one research paper on the core contributory work of dissertation published or accepted in peer reviewed, indexed journal.
Examinee has to submit supporting documents in relation to above mentioned academic activities at the time of Practical examination.

<table>
<thead>
<tr>
<th>Pattern of Practical Examination</th>
<th>Total Marks : 100</th>
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<tbody>
<tr>
<td><strong>Duration of the practical:</strong></td>
<td>2 days</td>
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<tr>
<td><strong>1. Identification of the specimen:</strong></td>
<td>10 Marks</td>
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<td><strong>2. Drug Processing</strong></td>
<td>30 Marks</td>
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<td></td>
<td>(10+10+5+5)</td>
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<td><strong>Major Practicals:</strong></td>
<td>2 (1 Rasashastra and 1 Bhaishajya Kalpana)</td>
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<tr>
<td><strong>Minor Practicals:</strong></td>
<td>2 (1 Rasashastra and 1 Bhaishajya Kalpana)</td>
</tr>
<tr>
<td><strong>3. Drug testing and Analysis</strong></td>
<td>10 Marks (5+5)</td>
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<tr>
<td>i) Rasaushadhi – 1</td>
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<td>ii) Kashthaushadhi – 1</td>
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<td><strong>4. Power Point Presentation</strong></td>
<td>on dissertation work: 15 Minutes</td>
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<td>10 Marks</td>
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<tr>
<td><strong>6. A Demo Lecture</strong></td>
<td>on any subject topic: 10 Minutes</td>
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<td>10 Marks</td>
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<td><strong>7. Documentation</strong></td>
<td>15 Marks</td>
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<tr>
<td>Journals (Practical Records)</td>
<td>of minimum 75 practicals (25 each from Rasa Shastra, Bhaishajya Kalpana and Analytical part).</td>
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<tr>
<td>Reports of the Visits</td>
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<td>Case Records</td>
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<td><strong>8. Viva Voce examination</strong></td>
<td>15 Marks</td>
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**Reference Books:-**

Rasahridaya Tantra
Rasarnava
Rasaratna Samuccahaya
Ayurved Prakasha
Rasendrachudamani
Rasendra Chintamani
Rasatarangini
Rasapraksha Sudhakar
Rasamrita
Rasa Chandanshu : CCRAS Publication
Sharangadhara Samhita
Sharangadhara Darpan (BP Pandey)
Bhavaprakash
Yoga Ratnakara
Bhaishajya Ratnavali
Siddha Bhaishajya Manimala
Ayurvediya Aushadhikarana – Puranik and Dhamanakar
Bharat Bhaishajya Ratnakara
Rasayoga Sagara
Siddha Bhaishajya Manimala
Siddha Yoga Sangraha – Yadavaji Trikamji Acharya
Sahasrayoga
Vaidyaka Paribhasha Pradeepa
Dravyaguna Vijnan Part - 1 and 2 - Yadavji Trikamji
Chakradatta - Ratnaprabha,
Relevant Parts from Charaka Samhita, Sushruta Samhita, Kashyapa
Samhita, Ashtanga Sangraha, Ashtanga Hridaya,
Remington: Science and Practice of Pharmacy
Theory and Practice of Industrial Pharmacy – Leon Lachman et al
Clinical Pharmacology, KD Tripathi
Clinical Pharmacology, Lawrence Benette
Drug Discovery and Evaluation (Pharmacological assays) HG Vogel
Pharmacological Basis of therapeutics – Goodman and Gilman
Data Base of Medicinal Plants of CCRAS
Quality and Standards of Medicinal Plants – ICMR publication
Quality Control of Ayurvedic Drugs – PLIM, Gaziabad

Ayurvedic Pharmacopeia of India
Ayurvedic Formulary of India
Indian Pharmacopeia
British Pharmacopeia
United States Pharmacopeia
Pharmacopeia Codex

Current Good Manufacturing Practices
Drugs and Cosmetic Act 1940 and Rules 1945 with latest amendments
Drugs and Magic remedies (Objectionable advertisement) Act-1954
Prevention of Food Adulteration (PFA) act
Laws pertaining to Narcotics
Factory and Pharmacy Acts
Consumer Protection Act -1986

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

Rutleys Elements of Mineralogy
Bhasma Vigyaniyam
Kupipakva Vigyaniyam
Anupana Manjari

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(Iatrochemistry & Pharmaceuticals Science)

Additional Points In Existing Syllabus

PAPER – IV

1. Pharmacology and Pharmacy Management

PART - A

Introduction to OECD Guidelines & CPCSEA.
(*The point ‘Animal Ethics’ is elaborated for clear understanding.)

Dr. Archana Gharote
Professor & HOD
Dept of Rasa Shastra