NATIONAL INSTITUTE OF AYURVEDA

DEEMED TO BE UNIVERSITY (DE-NOVO)

(Ministry of AYUSH, Govt. of India)

PROSPECTUS

FOR ADMISSION

TO

M.Sc. Courses

FOR THE ACADEMIC SESSION 2024-2025

NATIONAL INSTITUTE OF AYURVEDA
DEEMED TO BE UNIVERSITY (DE-NOVO)
Jorawar Singh Gate, Amer Road, Jaipur-302002
(Rajasthan) Tel:0141-2635292, 2635740, 2635744
(EPABX), Fax : 2635709
Website : www.nia.nic.in E-mail nia-rj@nic.in

INDEX

Message from Vice-Chancellor's Desk...

Dear students, Ayurveda scholars and Ayurveda lovers, it is my pride privilege to greet you for showing interest in Ayurveda a' Science of life ' and Ayurvedic education. National Institute of Ayurveda (Deemed to be University) is an apex autonomous National Institute in the country under the Ministry of AYUSH , Govt. of India. Institute is having the mandate of Ayurvedic teaching, training, patient care and research. It is matter of extreme happiness that institute is performing its activities according to the mandate given and has a long track record of excellence and credibility at National and International platform. This is only Govt. of India Public Institute having Post-graduation (MD/MS Ayu.) and Fellowship programmes (Ph.D.) in all the specialties of Ayurveda & 6 Exclusive Interdisciplinary Post-graduation (M.Sc).With 125 in take sin UG (BAMS) it is also running Diploma in Pharmacy & Nursing (DANP), one-year Panchakarma Technician Course, Numerous certificate courses of short term and medium-term duration. NIA is not only famous within the country but also attracts good number of foreign students in UG, PG, and Ph.D. programs. The real strength of the Institute is highly qualified, experienced and dedicated faculty in good number with supporting technical and ministerial staff, best available infrastructure and well-behaved students.

NIA provides excellent environment for its students, scholars and researchers. **"Our mission is to provide positive catalytic impulses to every student/scholar to stretch his/her in herent learning competencies and develop himself as a best clinician, academician, researcher and entrepreneur in Ayurveda".** For us each student is important and we focus on his all-round development to become a brand ambassador of Ayurveda and Institute.

Ministry of HRD on the recommendations of UGC notified that institute as Deemed to be University under De-novo category on 9th November 2020. Hon'ble Prime Minister Sh. Narendra Modi Ji dedicated the Institute as Deemed to be University to the nation on 13th November 2020.

The institute has achieved important landmarks viz. accreditation from National Assessment and Accreditation Council (NAAC), accreditation from National Board for Accreditation (NABH), Guinness world record, GMP certified Pharmacy, permission from NCISM, super-specialised OPD sin campus hospital and a starting of rural hospital in Jaisingpura Khor. Our goal is to achieve the status of Institute of National Importance. We hope that with the effort so four learned faculty, dedicated staff and students we shall achieve our aims. It is my sincere appeal to all the students to follow the rules, become disciplined and dedicated for studies. I wish all the students' Best luck'.

Jai Ayurveda !

Prof. Sanjeev Sharma
Vice-Chancellor

AN OVERVIEW

National Institute of Ayurveda (Deemed to be University) is an apex Institute under the Ministry of AYUSH, Government of India for promoting the growth and development of Ayurveda as a model Institute for evolving high standards of Teaching, Training, Research, Patient Care and also to invoke scientific outlook to the knowledge of Ayurvedic System of Healthcare.

The City of Jaipur was established 288 years back and by linking with it, the Institute has a glorious tradition of about 151 years when the Department of Ayurveda was started in 1865 in the Maharaja Sanskrit College, Jaipur which gained popularity as the "Jaipur School of Thought". An independent Ayurvedic College was established in August 1946 by the Government of Rajasthan and this College was merged to form National Institute of Ayurveda, known as NIA, in Ayurveda fraternity on 7thFebruary 1976. This was one of the very few Ayurvedic Colleges in the country to introduce Post- Graduate Education in Ayurveda as early as in 1970. Now it has achieved as Deemed to be University status w.e.f 09/11/2020.

After its establishment in 1976, the Institute has grown tremendously in the field of Teaching, Training, Research, Patient Care etc., as a result of which it has now 20 specialties for Post-Graduate Education (14 M.D/M.S.(Ayu) & 6 Interdisciplinary) as well as Regular Fellowship Program leading to Ph.D. Apart from this, Graduation Course, Diploma Course in AYUSH Nursing & Pharmacy and various certificate courses are also there.

Since its existence, it has continuously been engaged in promoting reforms and development sin Ayurveda System of Health care at National and International level. The Institute is not only a premier Institute under the Central Government but also amongst apex Institutions in the field of Ayurvedic education and training in the country and comparable to none as far as Ayurveda is concerned.

NIA has made a name of excellence in teaching, training and patient care activities and having in comparable academic standard sin the field of Ayurveda at Graduation, Post-Graduation, Fellowship (Ph.D.), Diploma and Certificate levels.

LOCATION

The Institute is located in Jaipur, the Capital of 'Rajasthan State'. Jaipur, a heritage city, is one of the world's most picture sque cities and is also perhaps among the world's first 'planned cities'. It is popularly known as “The Pink City of India”; a name derived from its many pink sandstone buildings. The Institute is situated about 8 kilometres from the Railway Station and about 15 kilometres from the Air Port. Two National Highways, No. 8 from New Delhi to Bombay and No.11 from Agra to Bikaner in Western Rajasthan asses through Jaipur.

CAMPUS

The Main Campus of the Institute consists of a number of multi-storied buildings of Academic and Hospital complex. Academic complex is one of the housing 20 Teaching Departments, the irattached Laboratories, Chambers of Teachers, Offices, Seminar Halls, Museums, Lecture Theaters and Classrooms fitted with modern teaching aids like DLP Projector, Audio-Visual Aids, Library, etc. Whereas Hospital Complex is the other one housing 300 Bedded Hospital, OPD, Panchakarma Unit, Central Laboratory, Animal House, Deluxe Wards, Cottage Wards, Yoga Unit etc. There are 5 separate multi- storied Hostels for Boys and Girls, Virtual Dissection Table, Regional Raw Drug Repository (Western-Region) Pharmacy equipped with heavy furnaces and machineries for manufacturing various Medicines, Staff Quarters for Essential Staff, Guest House, Water Tank and Reservoir, etc. There is also a well-furnished Auditorium with a capacity of 500 Seats. There is also a NIA City Hospital with 20 beds in the heart of the City, which is 4 kilometres away from the main Campus, A Separate Clinic of NIA, named as 'Satellite clinic' providing OPD services is also there which is situated in Jawahar Nagar, a popular residential-cum-commercial area of the City and Village Hospital at Gogunda, district Udaipur, providing OPD Services.

VISION

The major vision envisaged for the Institute is help and contribute Globalization of Ayurveda and upgrading the Institute to the level of National Importance and Centre of Excellence by providing following services:

1. Best quality of Ayurvedic education leading to Graduate, Post-Graduate and Post-Doctoral Degree levels.
2. Diploma Course in AYUSH-Nursing& Pharmacy.
3. Many Short-Term Certificate, Teaching and Training in various fields of Ayurveda.
4. Providing the best Treatment facilities including Specialized Treatments to the general public.
5. Undertaking Scientific Research in various aspects of Ayurveda.
6. To attain the status of "Institute of National Importance" is also one of the major visions of the Institute.

MISSION

1 Improving the quality of higher education in Ayurveda.

2 Introduction of more PG and Fellowship Programs, Training in various aspects.

3 To promote the interdisciplinary approach to achieve integrated education.

4 Implementing Practice Based Research in treatment in order to give as cient if ic outlook to the Patient Care Activities in Ayurveda to valid ate Ayurvedic Treatment.

5 Undertaking various Research Activities for the welfare of mankind.

6 Foreign Exposure Training Programs for Foreigners (Medical as well as Non-Medical) interested in the basic knowledge as well as higher knowledge in Ayurveda.

7 Providing expertise in Ayurveda to foreign students interested in Ayurveda.

OBJECTIVES

1. To promote the Growth and Development of Ayurveda;
2. To produce Graduates and Post-Graduate sin all Ayurveda& Interdisciplinary branches;
3. To conduct Research on various aspects of Ayurveda;
4. To provide Medical Care through Ayurvedic System of Medicine to the suffering humanity;
5. To provide and assist in providing service and facilities of highest order for Research, Evolution, Training, Consultation and Guidance to Ayurvedic System of Medicine; and
6. To conduct Experiments and eve lop Patterns of Teaching Under-Graduate and Post-Graduate Education in all branches of Ayurveda.

FUNCTIONS

1. Under-Graduate, Post-Graduate and Ph.D. level Programs, Teaching and Training leading to the Degrees of BAMS, MD/MS (Ayurved),M.Sc.and Ph.D.(Ayurved).
2. Training to Medical Officers and Teachers of Ayurveda as sought from other State Governments.
3. Diploma in AYUSH Nursing& Pharmacy and Panchakarma Technician course.
4. Certificate Courses for Ksharasutra, Standardization on Ayurvedic Medicinal Plant Material, Advanced course

on training for Beauty Care in Ayurveda, Training for Beauty care through Ayurveda, Nutrition and Dietetics in Ayurveda, Training on Ayurvedic Methods of cooking, Primary Health care through kitchen spices and local plants, Stree Roga Sthanika Chikitsa and Panchkarma Technician.

5. Conducting ROTP, CME, TOT and similar programs for the benefit of Teachers, Medical Officers and Physicians of the country for getting advanced and up dated knowledge.
6. Collaborative Research with National level institutions and also with foreign countries interested to adopt Ayurveda as a System f Medicine in their countries.
7. Foreign Exposure Training Programs.
8. Undertaking PPP Projects for Specialized Treatments, Training and Research.
9. Providing Ayurvedic treatment to general public through its OPD and IPD services.
10. Providing Ayurvedic treatment to SC and ST in habited are as of Rajasthan under the SCP/TSP Scheme subject to budgetary al location.
11. Active participation in Arogya Melas, Exhibitions etc.
12. Conducting National and International level Seminars, Conferences & Webinars.

Important Officers:

	Designation	Name	Contact Number (91-141-2635816+ Ext)
1.	**Vice-Chancellor**	Prof. Sanjeev Sharma	101
2.	**Pro Vice-Chancellor (I/C)**	Prof. P. Hemanta Kumar	151
3.	**Registrar (I/C)**	Prof. Anita Sharma	152
4.	**Joint Registrar (I/C)**	Dr. Narinder Singh	
5.	**Joint Director (Admn.)**	Mr. Jai Prakash Sharma	102
6.	**Deputy Director (Admn.)**	Shri Chandra Shekhar Sharma	104
7.	**Administrative Officer**	Shri Naresh Kumar Gupta	
8.	**Controller of Examination**	Prof. Ashok Kumar	131
9.	**Dean UG**	Prof.Hari Mohan Lal Meena	151
10.	**Dean PG**	Prof. Gopesh Mangal	
11.	**Dean Paramedical**	Prof. Ashok Kumar	132
12.	**Dean Research**	Prof. Nisha Ojha	201
13.	**Dean Students' Welfare**	Prof. Sunil Yadav	192
14.	**Dean Ph.D.**	Prof. Chhaju Ram Yadav	251
15.	**Dean International Studies and Foreign Student'sAffairs**	Prof. Sudipta Kumar Rath	153
16.	**Dean Interdisciplinary Studies**	Dr. Sarvesh Agrawal	228

Important Contact Numbers	
Anti-Ragging	
National Anti-Ragging Helpline	18001805522
National Women Helpline	1091
SC-ST Cell	18001806025

INTERDISCIPLINARY POST-GRADUATE COURSE – M.Sc.

Aim and Objective:

The aim of the Interdisciplinary Post-Graduate course is to provide proper training to the scholars and make them competent teachers, research workers and specialist sin the respective subjects.

P.G. Departments :

The Institute conducts Interdisciplinary Post-Graduate education for the award of M.Sc. Degree in the following 2 specialities-

Departments (Specialities)

1.	Ayurveda Manuscriptology	(Ayurveda Manuscriptology)
2.	Vrikshayurveda	(Prevention, Cultivation & Development of medicinal Plants)

Internal Faculty Members

1. Department of Ayurveda Manuscriptology

i. Prof. Nisha Gupta, Professor & Head
ii. Dr. Asit Kumar Panja, Professor
iii. Dr.Praveen Kumar B, Assistant Professor (Contractual)
iv. Shri Anil Kumar Sharma, Assistant Professor ,Sanskrit (Contractual)

2. Department of Vrikshayurveda

i. Dr. Sudipta Kumar Rath, Professor & Head
ii. Dr. Sumit Kumar Nathani, Associate Professor
iii. Dr. Tarun Sharma, Assistant Professor

*Adjunct Faculty in respective Departments are appointed.

Eligibility for Admission:

1. M.Sc. in Ayurveda Manuscriptology- BAMS/BHMS/BUMS/BNYS/MBBS/ M.A in Sanskrit from a recognized college affiliated with the recognized University. Aspirants must be registered in Prospective State/Central board of Registration.

2.M.Sc. in Vrikshayurveda- B. A. M. S./B.Sc. (Agriculture) /B.Sc. (Horticulture)/ B.Sc. (Forestry)/ with minimum 50% Marks from a recognized university.

Fee Structure:

First Year M.Sc.	**Rs. 37650/- (Includes Refundable Rs. 8000/-)**
Second Year M.Sc.	**Rs. 26650/-**

Duration of the Course and Examination Policy:

(1) The student shall have to undergo study for a period of two years after the admission having two examinations as follows:

1st Year- The Preliminary Examination at the end of one academic year after admission.

2nd Year- The Final Examination at completion of one academic year, after passing the Preliminary Examination.

(2)The student shall have to attend minimum seventy-five percent of total lectures, practical and clinical tutorials or classes to become eligible for appearing in the examination.

(3) A candidate has to secure minimum 50 percent in both theory and practical for promotion to next academic year.

(4) If any candidate fails to secure minimum passing marks, he/she will have to appear for supplementary exam.

Method of Training:

- The Scholars admitted will be given intensive training in classical knowledge along with comparative and critical study of the subject.
- The student of various specialties shall have to do duties in Hospital/ Pharmacy/ Herbal Garden/ Laboratory/ Field Work during the course of study as and when required, as per directions given by respective HOD/Supervisor.
- The student shall attend special lectures, demonstrations; seminars, and such other activities as may be arranged by the Institute.
- The student shall have to acquire the knowledge about the methods and techniques of research in the respective fields making use of information technology
- The student shall undertake training in teaching technology and research methods and shall participate in the teaching and training programs of nursing students, under-graduate students or interns in the respective subjects during the course of studies.
- In the clinical training, the student shall have to acquire knowledge of independent work as a specialist.
- The student shall undergo training of investigative procedures, techniques and surgical performance of

procedures and management in the respective specialty.

Medium of Training:

Sanskrit / Hindi / English shall be the medium for the Post-Graduate training and dissertation. The question papers will be set in Sanskrit / Hindi / English and the candidate can answer in Sanskrit or Hindi or English.

Stipend:

Currently, there will not be any stipend for the students. But, the institute may decide regarding the same in due course of time.

Leaves :

The following types of leave facilities are available to the post graduate scholars:

1. 24 days casual leaves in an academic year.
2. As per the notification of government of India, 6 months maternity leave to female scholars and 15 days paternity leave to male scholar once during the study period. The female scholar who avails any number of maternity leaves, her examination will be extended six months i.e., next scheduled examination of the Institute. However, the fellowship will be given only for total 24 months duration.
3. Ten days term leave after completion of 1st academic year.
4. On the recommendation of the Head of Department/Supervisor concerned, 20 days academic leaves may be granted during entire PG course for conducting research work/seminar/workshop at other Institution/ places.
5. Regarding participation& Presentation of Paper in any seminar/Workshop/conference, candidates shall be paid maximum of Rs 2000/- or the actual registration fee, maximum of 2 times in the entire course duration.
6. Any kind of Leave can be availed only after written application to HOD.
7. In case student remains absent for more than 30 days without prior intimation, admission in Interdisciplinary M.Sc course such student will stand terminated automatically without any notice.
8. The student undergoing interdisciplinary M.Sc. course is not permitted to any paid appointments / service / work or engages himself in self-employment. The candidate is directed to obtain N.O.C. for any interview while submitting an application for any new job/ appointments. The defaulters are liable for disciplinary action such as recovery of fellowship and termination of admission

GALLERY


types of manuscript
Talpatra
Tal-patra manuscripts are usually seen in the form of bundles of 50 to 100 neatly shaped leaves of even size strung together with a cord and pressed between two wooden boards. Some collections also have metre-long uncut leaves, with midribs intact, rolled like a carpet.
Dispersion
Tal-patra manuscripts are found mainly in the coastal states of India, where the Palmyra palm tree generally grew; though collections of these manuscripts are dispersed all over India in peoples' homes, mathas', granthagars', libraries, research institutions, archives and museums.
Brief note on preparation of support
The leaves of the Palmyra or Talipot palm are dried in a controlled manner and then prepared for writing on by submerging in ponds, boiling in water and rubbing spices like turmeric on them. The midrib is often removed and the leaves are cut to make a bundle of folios of even size.


डेमो हर्बल गार्डन
DEMO HERBAL GARDEN

Syllabus: 1st Year

Paper 1: Basics of Ayurveda

Teaching Hours: 150 (Theory) **Max. Marks: 100**

Paper 1	Basics of Ayurveda	180 Hrs.
	Unit: 1	
1.	Definition and components of Ayu, definition and aim of Ayurveda, Brief introduction of Ayurveda Samhitas.	4
2.	Definition of Swasthapurush, introduction of parameters of Swasthya and Traya-upastambha.	6
3.	Introduction of concept of Panchmahabhuta theory, Tridosha theory and Lokasamyapurush.	6
4.	Introduction of concept of Saptadhatu, Mala and Ojus	4
5.	Introduction of concept of Srotas	3
6.	Introduction of concept of Prakriti, Mana andAtma	5
7.	Introduction of concept of Raspanchaka	7
8.	Introduction of Panchvidhakshayakalpana	2
9.	The concept of Roga, Main etiological factors, Chikitsa and its types	4
10.	Introduction of various sections/departments of Ayurveda and theirspecific activities	14
	Unit: 2	
11.	Definition of Word Research and Classification of Research – (pure/applied; qualitative/quantitative; observational and interventional).	5
12.	Historical Background of research in Ayurveda.	2
13.	Introduction to Classical methods of research-Aptopdesh, PratyakshaAnuman and Yukti.	6
14.	Research Process - Brief Introduction of Selection of Topic, Review of literature, Formulation of Hypothesis, Aims and Objectives, Materials and Methods, Observation and Results.	4
15.	Concept of Ethics in Research.	2
16.	Publication of Research, Structuring of Article (IMRAD).	4
17.	Brief Introduction of Medical Statistics.	2
18.	Collection and Presentation of Data.	4
19.	Definition of Average, Percentile, Arithmetic Mean, Median, Mode, Range, Standard Deviation and Standard Error.	5
20.	Parametric and Non-parametric Tests.	6

Paper 2: Basic of Manuscriptology and Collection of Manuscripts

Teaching Hours: 150 (Theory) **Max. Marks: 100**

Paper 2	Basic of Manuscriptology and Collection of Manuscripts	Hrs.
1.	Introduction of Manuscriptology.	10
2.	Language Spoken and Written in Ancient India.	20
3.	Detailed History of writing in various parts of India.	10
4.	Detailed study and various aspects of Orientology.	10
5.	Indology and Manuscriptology.	10
6.	Descriptions of varieties of Manuscripts and Character of Varieties.	20
7.	Brief outline of lithography (Printing on Stone Blocks), Xylography	10

	(Printing on Wooden Blocks), Epigraphy (Study of Writing on Rocks,Pillars, Utensils and Metal Plates), Palaeography (Study of Ancient Scripts their Origin, Development of Pictoral and Phonetic Symbols).	
8.	Importance and Utility of Sanskrit Language in Ayurveda Manuscriptology.	15
9.	Collection of Manuscripts: Purpose and Goal.	10
10.	Description of Methods of Collection of Manuscripts.	10
11.	Communications, Collection Reporting of Manuscripts.	10
12.	Manuscript libraries of India and Brief Description of Their Collections.	10
13.	Major Collection of Ayurveda Manuscripts in India and Abroad.	5
	Total	**150**

Paper 3: Preservation, Cataloguing of Manuscripts

Teaching Hours: 150 (Theory) **Max. Marks: 100**

Paper 3	Preservation, Cataloguing of Manuscripts	Hrs
1.	Preserving, storage and cataloguing of manuscripts: Brief outline	5
2.	Details description of various aspects and methods of preservation	5
3.	Details description of various aspects and methods of storage of manuscripts.	15
4.	Repairing of manuscripts as per the condition.	5
5.	Cataloguing of manuscripts: History of cataloguing of manuscripts	5
6.	Various methods of cataloguing	10
7.	Different catalogue on manuscripts	10
8.	Available catalogues on Ayurveda Manuscripts.	5
9.	Catalogus catalogorum and new Catalogus Catalogorum.	10
10.	Preservation: of manuscripts ; Brief outline	10
11.	Lamination, photo copying, microfilming and digitalization	15
12.	Digitalization through Scanner, Digital camera	15
13.	Basic knowledge of hardware and software needed for digitalization, storage, editing and Mechanical reproduction of manuscripts	10
14.	Knowledge of specific software like html editor, OCR, image editor, palm leaf manuscript editor etc.	10
15.	National Database of Manuscripts, Kriti Sampada, of NMM	5
16.	Historical Survey and Current Practices	5
17.	Government Initiatives	5
18.	Description of various national and international rules and regulation regarding manuscript collection, communication, editing, publications etc.	5
	Total	**150**

Paper 3: Writing of Manuscripts

Teaching Hours: 150 (Theory) **Max. Marks: 100**

Paper 4	Writing of Manuscripts	Hrs
1.	Form of Manuscript – e.g. Size, Margin, Line Numbering, Paintings, Unconventional Form etc.	5
2.	Parts of Manuscript – Cover, Binding, Recto, Verso etc.	5
3.	Style of Composition of Manuscripts – Running Texts, Text and Commentary, Sub-Commentary etc.	5
4.	Writing in Manuscripts: - Brief Outline	2
5.	Various Styles and Techniques.	5
6.	Marginalia and Pagination.	5
7.	Punctuation, Abbreviations.	5

8.	Prashasti, and Colophon.	5
9.	Scribal Remarks.	5
10.	Illustration and Decoration	5
11.	Corrections	10
12.	Description of Scribal Errors: Brief Outline	3
13.	Deletion /Omission	5
14.	Addition, Substitution	5
15.	Orthographic Confusion	5
16.	Transposition	5
17.	Brief Description of Prosody and Sanskrit Grammar (Sandhi, Samasa, Pratyaya, Sup-ting Prakarana)	15
18.	Brief Outline various aspects of Writing in Ancient India and the Scribe.	10
19.	Details Description of Writing Materials.	5
20.	Details of Preparation of the Writing Materials.	5
21.	Writing Instruments.	5
22.	Writing Ink	5
23.	Binding of Manuscripts	5
24.	Other Supporting Materials.	5
25.	Brief Description of Ethics and Code of Conduct of Writing.	10
26.	Importance of Ethics and Principles Mentioned in Ayurveda Classics in the Purview of the Present Era.	5
	Total	**150**

Practical of M.Sc. First Year

Teaching Hours: 480 Hrs. **Max. Marks: 100**

S.No	Topic	360 Hrs.
1.	Assessment of Prakriti	10
2.	Determination of Rasa Panchaka in Some Common Dravyas.	10
3.	Practical Uses of Tantrayukti in Understanding Ayurveda Text	10
4.	Practical Uses of Tachchilya in Understanding Ayurveda Text	10
5.	Practical Uses of Tantraguna, and Tantradosha in Composing Ayurveda Text.	10
6.	Practical Uses of Vadamarga in Understanding Ayurveda Text.	10
7.	Practical Uses of Kalpana and Arthashraya in understanding AyurvedaText.	10
8.	Practical Uses of Trividha Gyanopayain Understanding Ayurveda Text.	10
9.	Practical Uses of Pada, Paada, and Shloka Methods of Learning.	10
10.	Practical Uses of Vakya, Vakyartha in Ayurveda Teaching.	10
11.	Clinical Protocol Writing Exercise on a Given Problem.	15
12.	Scientific Article Writing.	5
13.	Details of various Writing in various Parts of India.	20
14.	Varieties of Manuscripts and Character of Varieties.	15
15.	Practical orientation on lithography, Xylography, Epigraphy,Palaeography	20
16.	Practical usages of Sanskrit in Ayurveda Manuscriptology	15
17.	Description of methods of collection of manuscripts	20
18.	Preparation of Communications sheets, collection reporting of Manuscripts.	30
19.	Various Methods of Storage of Manuscripts.	20
20.	Repairing of Manuscripts as per the Condition.	20
21.	Various Methods of Cataloguing.	20
22.	Lamination, Photo Copying, Microfilming and Digitalization.	15
23.	Digitalization through Scanner, Digital Camera.	15

24.	Basic knowledge of Hardware and Software needed for Digitalization,Storage, Editing and Mechanical Reproduction of Manuscripts.	5
25.	Basic Training of Specific Software like HTML Editor, OCR, image editor, palm leaf manuscript editor etc.	15
26.	Storage of Palm Leaf Manuscripts	10
27.	Training of forma, styles and parts of Manuscript –etc.	20
28.	Training in various aspects of Writing in manuscripts:	30
29.	Corrections of Manuscripts	10
30.	Reading and identifying of Scribal errors:	20
31.	Brief description of Prosody and Sanskrit grammar (Sandhi, Samasa,Pratyaya, Sup-ting Prakarana)	20
32.	Writing Materials,	20
33.	Training of forma, styles and parts of Manuscript – etc.	20
34.	Training in various aspects of Writing in Manuscripts:	30
35.	Corrections of Manuscripts.	10
36.	Reading and Identifying of Scribal Errors:	20
37.	Brief Description of Prosody and Sanskrit Grammar (Sandhi, Samasa,Pratyaya, Sup-ting Prakarana)	20
38.	Writing Materials.	20

Syllabus: 2nd Year

Paper 1: Indian Scripts and Ayurveda Manuscripts

Teaching Hours: 150 (Theory) **Max. Marks: 100**

Paper 1	Indian Scripts and Ayurveda Manuscripts	150 Hrs
1.	1. Introduction of Indian scripts	2
2.	i. The scope and significance of palaeography in language studies	5
3.	ii. Ancient Writings in India – Indus script, Brahmi, Kharosti, Devanagari	10
4.	iii. Evolution of alphabet and numerical	10
5.	iv. Evolution of Indian Scripts from Brahmi	10
6.	v. The period of Gupta and Nagari scripts and its variant eastern (Poorvanagari), western (Ardha nagari), southern (Nandinagari) and northern (Devanagari).	15
7.	vi. Outline of Nepali and Newari, Oriya, Saarada, Maithili,	10
8.	vii. Outline of Grantha, Old kannada , Malayalam, Modi , Sinhalese Teluguor Andhra scripts	10
9.	2. Nandi Nagari and Devanagari Scripts : brief outline	2
10.	i. Scripts in detail	10
11.	ii. Characteristics and different variant of Nandi Nagari and Devanagari Scripts	10
12.	iii. Development of other later characters – Sarada, Gurumukhi, Sidhamathruka, Nagari	10
13.	iv. Old documents in both Scripts	2
14.	3. Reading and writing of scripts : Brief Outline	2
15.	i. Illustration of the script from estampages	5
16.	ii. Printed Ayurveda books and prepared charts	5
17.	iii. Available Ayurveda manuscripts	10
18.	4. Transliteration rules and methods: Brief Outline	2
19.	i. Both Nagari Script to Roman and English characters	10
20.	ii. Roman and English characters to both Nagari	10
	Total	150

Paper 2: Textual Criticism

Teaching Hours: 150 (Theory) **Max. Marks: 100**

Paper 2	Textual Criticism	Hrs.
1.	Description of Collation and methods collating of reading of manuscriptsand preparing collation sheets.	15
2.	Various kinds of texts in Ayurveda	10
3.	Details of Textual criticism i. Definition ii. Aim and Scope	5
4.	Conflated Manuscripts	5
5.	Textual criticism and Literary criticism	5
6.	Variants and errors	10
7.	Causes of corruption	5
8.	Remedies	5
9.	Transmitted texts	5
10.	Fundamental Aspects of Textual Criticism	5
11.	Heuristics /Recensio	5
12.	Emendation	10
13.	Higher criticism	3
14.	Problems of critical recensio	5
15.	Stemma Codicum	5
16.	Genealogy of Manuscripts	10
17.	Practical hints on Editing of texts	10
18.	Selection of Manuscripts	5
19.	Classification	3
20.	Description	2
21.	Pedigree	2
22.	Various aspects of Textual Criticism with respects to Ayurveda texts	15
	Total	150

Paper 3: Editing and Publication of Texts

Teaching Hours: 150 (Theory) **Max. Marks: 100**

Paper 3	Editing and Publication of Texts	Hrs.
1.	Editing scientific texts : Outline	10
2.	Rules and methods critical edition	20
3.	Rules of translation	15
4.	Preparation of texts : Outline	5
5.	Dating of undated manuscripts	10
6.	Evidence of Authorship	15
7.	Stylometric Analysis	10
8.	Publication of texts: Outline	5
9.	Presentation of texts	20
10.	Indexing methods	20
11.	Preparation of Annexure	20
	Total	150

Paper 4: Ayurveda Manuscriptology

Teaching Hours: 150 (Theory) **Max. Marks: 100**

Paper 4	Ayurveda Manuscriptology	Hrs.
1.	Description of various Published Editions of Vrihatrayee, Laghutrayee,	10
2.	Description of various Published Editions of Rasa-texts	10
3.	Description of various Published Editions of Nighantu	10
4.	Description of various Published Editions of other Classical Texts	10
5.	Details description of unpublished manuscripts of Vrihatrayee, Laghutrayee,	10
6.	Details description of Unpublished Manuscripts of Rasa-texts, Nighantu	10
7.	Details description of Unpublished Manuscripts of other classical texts	5
8.	Description of Unpublished Manuscripts of allied/Contemporary Ayurveda Manuscripts.	5
9.	Description of Unpublished Manuscripts of Super-specialty Ayurveda Manuscripts.	5
10.	Essential of Editing Vrihatrayee, Laghutrayee.	15
11.	Essential of Editing Rasa-texts, Nighantu and Other Classical Texts.	10
12.	Essential of Editing of Other Classical Texts.	10
13.	Variant reading and Process of patha sudhi in Ayurveda Manuscripts.	20
14.	Preparation of glossary of Technical Terms, Animal, Mineral, Plants and Products.	10
15.	Details of Works going on Ayurveda Manuscripts in various Institutions across the Globe.	10
	Total	**150**

Practical of M.Sc. 2nd Year

Teaching Hours: 480 (Theory) **Max. Marks: 100**

Sl.No.	Points of Practical	Hrs.
1.	Indus script, Brahmi, Kharosti,	10
2.	alphabet and numerical	10
3.	Indian Scripts from Brahmi	10
4.	Nagari scripts and its variant eastern (Poorvanagari), western (Ardha nagari), southern (Nandinagari) and northern (Devanagari).	20
5.	Nepali and Newari, Oriya, Saarada, Maithili,	5
6.	Outline of Grantha,, Old kannada , Malayalam, Modi , Sinhalese Teluguor Andhra scripts	5
7.	Nandi Nagari and Devanagari Scripts	10
8.	Characteristics and different variant of Nandi Nagari and Devanagari Scripts	5
9.	Characteristics and different variant of Sarada, Gurumukhi, Sidhamathruka, Nagari	5
10.	Script reading through Ayurveda manuscripts	20
11.	Transliteration of Both Nagari Script to Roman and English characters	10
12.	Transliteration of Roman and English characters to both Nagari	10
13.	Collation of manuscripts and preparing collation sheets.	30
14.	Orientation of Various kinds of texts in Ayurveda	10
15.	Lower criticism	15
16.	Higher criticism	30
17.	Practical hints on Editing of texts	20

18.	Various aspects of Textual Criticism with respects to Ayurveda texts	15
19.	Methods critical edition	20
20.	Translation	15
21.	Dating of undated manuscripts	20
22.	Evidence of Authorship	15
23.	Presentation of texts	10
24.	Indexing of Texts	20
25.	Preparation of Annexure	20
26.	Practical Training on various published editions of Vrihatrayee, Laghutrayee, Rasa-texts, Nighantu and other classical texts	10
27.	Practical Training on various un-published Manuscripts of Vrihatrayee, Laghutrayee, Rasa-texts, Nighantu and other classicaltexts	10
28.	Practical Training on unpublished manuscripts of allied / contemporary and super-specialty ayurveda manuscripts	10
29.	Training of Editing Vrihatrayee, Laghutrayee,	20
30.	Training of Editing Rasa-texts, Nighantu and other classical texts	20
31.	Variant reading and Process of patha sudhi in Ayurveda manuscripts	30
32.	Preparation of glossary of technical terms, animal, mineral, plantsand products	20

Syllabus:

1st Year

Sl.No	Paper 1	Basics of Ayurveda	135 Hrs
1	Unit: 01	Definition and Components of Ayu, definition and aim of Ayurveda, Brief introduction of Ayurveda Samhitas.	4
2		Definition of Swastha Purush, Introduction of Parameters of Swasthya and Tray-upastambha.	2
3		Introduction of Concept of Panchmahabhuta Theory, Tridosha Theory and Loka Samya Purush.	2
4		Introduction of Concept of Saptadhatu, Mala and Ojus.	2
5		Introduction of Concept of Srotas.	1
6		Introduction of Concept of Prakriti, Mana and Atma.	1
7		Introduction of Concept of Raspanchaka.	7
8		Introduction of Panchvidha Kshaya Kalpana.	1
9		The concept of Roga, Main Etiological Factors, Chikitsa and its Types.	1
10		Introduction of Various Sections/Departments of Ayurveda and their Specific Activities.	4
11	Unit :02	Vrikshayurveda : History and Scope of *Vrikshayurveda.* Introduction : Ayurveda as bioscience, different faculties of Ayurveda like Gajayruveda, Vrikshayurveda, relation between Vrikshayurveda and Ayurveda, important works on Vrikshayurveda, different contexts wehre Vrikshayurveda is mentioned-chronology.	58
		1. Classification of Sthavaram sub-classification of Udbhijas in the context of Vrikshsayurveda . Explanations for the terms Vriksha, Udbhija, Padapa etc., presence of life in plants.	2
		2. Relation between Loka and Purusha in general and particular in the context of Vrikshayurveda. Properties of Dosha, Dhatu and their relation to Panchamahabhuta, relation of Dosha, Dhatu and Mala to each other in general. Mode of nutritiion and related Nyayas, their directives in Vrikshayurveda, mentionng the difference between living and non-living in terms of Vrikshayrurveda.	3
		3. Vanavargas described in ancient India; possible correlation with agro-climatic and geographical zones.	3
		4. Desha: Different classification on Desha by various scholars. Study of Jangala, anupa, sadharana dehsas in detail in terms of Ayurveda and Vrikshayurveda mentioning abundance of area specific plant population.	4
		5. Parts of the plants that are important in the context of Vrikshayurveda for collection, propagation etc.	5

		A. Patra: Synonyms, functions, different parts of the patra and diffeent types of patras. B. Pushpa: Synonyms, functions and different parts of Pushpa. Description of different types and classification based on floral characters. C. Phala: Synonyms, functions, different parts of the phala and diffeent types of phala. D. Bija : Synonyms and functions. Description of diffeent types of Bija. E. Mula: Synonyms and functions. Description of types of mulas.	
		6. Bijopti: Processes, involvement of different factors, processing of various kinds of Bija before sowing; and special processing of seeds.	5
		7. Preparation of land, various description on fertile land, suitable season for plantation.	5
		8. Directives on preparation of seed bed, replantation spacing.	5
		9. A. Irrigation : History, modes, source, protection of sources, description on different contexts. B. Directives for irrigations in newly germinated plants, seasonal directives and directions on quality. C. Importance of water.	5
		10. A. Descriptions on plant diseases: Involvement of Doshas in the pathological conditions, specific symptoms, treatment. B.Accidental causes like worm infestations, fire, storm etc. and their treatment, vajikrutajirna and its treatment. C. Preventive measures for air, water pollution in context of Vrikshayurveda.	20
12	Unit :03	Definition of Word Research and Classification of Research – (pure/applied; qualitative/quantitative; observational and interventional)	5
13		Historical Background of Research in Ayurveda.	2
14		Introduction to Classical Methods of Research- Aptopdesh, Pratyaksha Anuman and Yukti.	6
15		Research Process- Brief Introduction of Selection of Topic, Review of Literature, Formulation of Hypothesis, Aims and Objectives, Materials and Methods, Observation and Results.	4
16		Concept of Ethics in Research.	3
17		Publication of Research, Structuring of Article (IMRAD).	4
18		Brief Introduction of Medical Statistics	2
19		Collection and Presentation of Data.	4
20		Definition of Average, Percentile, Arithmetic Mean, Median, Mode, Range, Standard Deviation and Standard Error.	5
21		Parametric and Non-Parametric Tests.	6

22	Unit : 04 special formulation of Vrikshayurveda	1. A.Different formulations and mode of administration for nourishments (minimum5 formulations, minimum 3 mode of administrations) with the background of Dravyaguna Vigyan. B. Description on Kunapajala & related formulations	3
23	Unit :05 Ethno-botany and folklore medicine	Ethnobotany, its scope, interdisciplinary approaches.	2
24		Ethnic groups of India : major and minor tribes, life styles of ethnic tribes, conservation practices of biodiversity, taboos and totems.	3
25		World centers of Ethnobotany with special reference to India	2
26		Role of Ethnobotany in national priorities specifically health care	2

27	Unit :06 Introduction to Dravyagunavigyan	Dravyaguna Shastra Paribhasa- Lakshana of SaptaPadartha of DravyagunaVijnanavizDravya- Rasa- Guna- Virya- Vipaka- Prabhava and Karma.	14
28		Dravya: Etymological derivation, definition, panchbhoutikatwa. Classification of Dravya according to Samhitas and Nighantus Taxonomical classification.	1
29		Guna: Etymological derivation, definition and Classification of Guna. Detailed knowledge of Gurvadi Guna & Paradigunas.	2
30		Rasa: Etymological derivation, definition, Meaning of "Rasa" in various contexts. Shad Rasas (Madhura, Amla, Lavana, Katu, Tikta, and Kashaya), Panchabhautik constitution of Rasas, Nirvrittiviseshakrama (manifestation in general and particular), Ritu and shad rasa Rasanurasayohbheda (Difference between rasa and anurasa), Lakshana (characteristics),Guna and Karma of shad Rasas, Kopana and Shamana of Dosha and dushya by Shad rasas. Effects of excess usage of Rasa. Rasopalabdhi, Rasaskandha.	2
31		Vipak- Etymological derivation, definition, swaroop, types, guna and karma, vipakopalabdhi, difference between rasa and vipak, importance of vipak	1
32		Veerya - Etymological derivation, definition, swaroop, number of veerya, panchbhautika composition, actions, veeryoplabdhi, veeryanirdharana, importance of veerya	1
33		Prabhav - Etymological derivation, definition, swaroop	1
34		Karma - Etymological derivation, definition, swaroop, brief knowledge of different types of karma mentioned in ayurveda	6

Sl.No.	Paper 2	Plant Systematic,physiology , Morphology and pathology	135 Hrs
1.	**Unit 1 - Plant Systematic**	Angiosperm Morphology, structural units and floral symmetry, dicot and monocot flower; structure, diversity origin and evolution of stamen, carpels; placentation types and evolution. Floral adaptation to different pollinators.	10
2.		Angiosperm Taxonomy: Scope, aims, principles of taxonomy, historical development of plant taxonomy, Taxonomic structure: taxonomic hierarchy, concept of taxa, concept of species, concept of genus and family.	5
3.		Classification of angiosperms: Natural, Artificial, Phylogenetic system of classification	2
4.		Systems of classification: Linnaeus, Bentham & Hooker and Hutchinson (merits and demerits)	2
5.		Taxonomic tools: herbarium, floras, monographs, botanical gardens, biochemical and molecular techniques, computers and GIS.	3
6.		Plant nomenclature: Salient features of ICBN Probable ancestors of angiosperms, primitive living angiosperms, speciation and extinction, IUCN categories of threat, distribution and global pattern of biodiversity.	3
7.		Study of Families (Dicot): Ranunculaceae, Fabaceae (Papilionoideae, Caesalpinioidae, Mimosoidae) Cucurbitaceae, Lamiaceae, Asteraceae, Apocynaceae, Euphorbiaceae, Amaranthaceae	10
8.		Study of Families (Monocot): Liliaceae, Poaceae, Orchidaceae	5
9.	**Unit 2 Plant metabolism and development**	Plant-water relations: Properties of water, diffusion, diffusion pressure deficit and its significance; Osmosis: Concept, types, osmotic potential and its significance; Imbibition: concept and significance Water conduction through xylem: Root pressure theory, cohesion-adhesion theory; transpiration; stomatal opening mechanism with reference to K+ -malate hypothesis Phloem transport: Munch hypothesis	10
10.		Mineral nutrition: Role and deficiency symptoms of macro- and micro- nutrients (N, P, Fe, Mn, B, Ca); Solute transport: passive (Donnan's equilibrium), active (carrier concept) Respiration: Structure of ATP, types (aerobic and anaerobic respiration), respiratory substrates and Respiration quotient, glycolysis, Kreb's cycle, oxidative phosphorylation (ETS), chemiosmotic potential theory; fermentation (alcohol and lactic acid), photorespiration	10
11.		Photosynthesis: concept, definition, significance, photosynthetic pigments and their role, action spectra, Emerson's enhancement effect, red drop mechanism; photolysis of water (Hill's reaction), cyclic and non-cyclic photophosphorylation, Light independent reactions: C3, C4 and CAM pathways and their significance; factors affecting photosynthesis Nitrogen metabolism: Mechanism of biological nitrogen fixation, importance of nitrate reductase	10

12.		Phytochromes: Pr and Pfr forms, their role, Circadian rhythms and biological clock	4
13.		, Plant growth regulators: Role of auxin, cytokinins, gibberilins, ABA and ethylene, Plant movements: Tropic and nasticmovements Photoperiodism: physiology of flowering, photoperiodism and vernalization, role of florigen	8
14.		Senescence and abscission	2
		Plant defence: Definition: Hypersensitive response and Systemic acquired resistance; Role of secondary metabolites (Terpenes and phenolic compounds)	5
15.		Seed dormancy: Causes and role, methods to break seed dormancy	4
16.	**Unit 3 Plant pathology**	Importance, definitions and concepts of plant diseases, history and growth of plant pathology in india, biotic and abiotic,causes of plant diseases.	5
17		Disease management :- Bacteria , fungi, viruses, Nematodes	10
18		Integrated plant disease management (IMD)	3
19	**Entomology**	Importance of plant pest, scope and objective of entomology	5
20		History of entomology in india	4
21		Major and minor pest of different crops	10
22		Integrated pest management (IPM)	3
			135 Hrs

Practicals:- Study of various tools required for different kinds of horticultural activities.
Preparation of seed bed for raising seedlings of medicinal plant species.
Study of various methods of irrigation.
Study of different methods of propagation of medicinal plants.
Study of different types of soils, preparation of land for cultivation, representative experiments related to sowing transplantation etc.
Studying different aspects of preparation of compost.
Study to identify different kinds of weeds seen in a cultivated field.
Identification of diseases and application of various fungicides, pesticides, manures, fertilizers etc. Calculation of the dose of fertilizers, insecticides and weedicides required for the cultivation of given crop.
Representative experiments related to cultivation, collection, and care etc. plants as per course.

Sl.No	Paper 3	Plant-Biochemistry, Plant pharmacognosy(Naamrupagyanam)	135 Hrs
1.	**Unit 1 Plant Biochemistry**	Biochemical organisation of the cell and transport processes across cell membrane.	3
2.		The concept of free energy, determination of change in free energy from equilibrium constant and reduction potential, bioenergetics, production of ATP andits biological significance.	5
3.		Introduction to 3D structure of protein, stability and denaturation of protein, allosteric proteins.	4
4.		Enzymes : Nomenclature, enzyme kinetics and its mechanism of action, mechanism of inhibition, enzymes and iso-enzymes in clinical diagnosis.	5
5.		Co-enzymes : Vitamins as co-enzymes and their significance, Metals as coenzymesand their significance.	5
6.		Lipids Metabolism : Oxidation of fatty acids, a-oxidation & energetic, B-oxidation, µ-oxidation, Biosynthesis of ketone bodies and their utilization, Biosynthesis of saturated and unsaturated fatty acids, Control of lipid metabolism,Essential fatty acids & eicosanoids (prostaglandins, thromboxanes and leukotrienes) phospholipids, and sphingolipids.	5
7	**Pharmacognosy**	General introduction - History, definition and scope of pharmacognosy Classification of crude drugs Scheme of pharmacognostic studies of crude drug,	3
8		Phytopharmaceutical	2
9	**Analytical pharmacognosy**	Drug adulteration , Adulterants, Substitutes and controversial drugs in Ayurveda and methods of their detection.	2
10		Methods of drug evaluation - Biological testing of herbal drugs, Phytochemical investigations	3
11	**Unit 3 Namroopgyaan**	Definition and importance of namroopagyanam	2
12		Ancient way of nomenclature of plants	2

13		The knowledge of following plants regarding the classification, **B**otanical name, family, synonyms, veraities, rasapanchak, , karma, uses, part used, dosage, as per Ayuvedic point of you**.**	80
		36. **Celastraceae:** Jyostismati *(Celastrus paniculatus),* Vikantaka *(Maytenus emarginata)* and Saptacakra *(Salacia chinensis).* *37.* **Rhamnaceae:** Badara *(Ziziphus mauritiana),* Ghonta *(Ziziphus xylopyrus)***.** *38.* **Vitaceae:** Draksha *(Vitis vinifera)* and Asthi-Samhara *(Cissus quadrangularis).* *39.* **Sapindaceae:** Aristaka *(Sapindus laurifolius and allied species)* Koshamra *(Schleicheraoleosa)* and Karnasphota *(Cardiospermum halicacabum).* *40.* **Anacardiaceae:** Bhallataka *(Semecarpus anacardium),* Karkatshringi *(Pistacia integerrima),* Pista *(Pistacia vera),* Priyalaka*(Buchanania lanzan),* Kajutaka *(Anacardium occidentale)* Amrataka *(Spondias pinnata)* and Amra *(Mangifera indica).* *41.* **Moringaceae:** Sigru *(Moringa oleifera).* *42.* **Fabaceae:** Aparajita *(Clitoria ternatea),* Asana *(Pterocarpus marsupium),* Raktachanadana *(Pterocarpus santalinus),* Bakuchi *(Psoralea corylifolia),* Yavasa *(Alhagi pseudalhagi),* Gunja *(Abrus precatorius),* Agastya *(Sesbania grandiflora),* Jayantai *(Sesbania sesban),* Kapikachhu *(Mucuna prurita),* Karanja*(Pongamia pinnata),* Palasha *(Butea monoaperma),* Paribhadra *(Erythrina variegate),* Vidari *(Pueraria tuberose),* Nilika *(Indigofera tinctoria),* Kulatha *(Dolichos biflorus),* Mashaparni *(Teramnus labialis),* Prishna-parni *(Uraria picta),* Shalaparni *(Desmodium gangeticum),*Mudga-parni *(Vigra trilobata),* Soya *(Glycine max),* Methika *(Trigonella foenum graecum),* Sharpunkha *(Tephrosia purpurea),* Yastimadhu *(Glycyrrhiza glabra),* Adhaki *(Cajanus cajan),* Tinisha (*Ougenia oojeinsis),* Shishappa *(Dalber- gia sissoo).* *43.* **Caesalpiniaceae:** Amali or Chincha *(Tamarindus indica),* Aragvadha *(Cassia fistula),* Chakramarda *(Cassia tora),* Kasamarda *(Cassia sophera and allied species),* Swarnapatri or Senna *(Cassia angustifolia)* Chakshuka *(Cassia absus),* Avartaki *(Cassia auriculata),* Ashoka *(Saraca asoca),* Kanchanara *(Bauhinia variegate and allied species),* Lata karanja *(Caesalpinia bonduc).* *44.* **Mimosaceae:** Arimeda *(Acacia leucophloea),* Babbula *(Acacia nilotica sub-species indica),* Khadira *(Acacia catechu),* Sveta Khadir *(Acacia Senegal),* Saptala *(Acacia sinuate),* Shirisha *(Albizia lebbock),* Lajjaluka *(Mimosa pudica),* Virataru *(Dichrostachys cinarea).* *45.* **Rosaceae:** Satapatrika *(Rosa centifoia),* Priyungu *(Prunus mahaleb),* Khubani *(Prunus armeniaca)* and Padamka *(Prunus puddum).*	30

		46. **Saxifragaceae*:*** Pashana-bheda *(Berginia ciliate).* *47.* **Crassulaceae:** Parna-bija *(Bryophyllum pinnatum).* *48.* **Combretacceae*:*** Arjuna *(Terminalia arjuna),* Haritaki *(Terminalia chebula),* Bibhitaka *(Terminalia bellirica)* and Dhava *(Anogeissus latifolia).* *49.* **Myrtaceae:** Jambu *(Syzygium cumini),* Lavanga *(Syzygium aromaticum*) and Tailaparna *(Eucalyptus globules).* *50.* **Barringtoniaceae:** Nichula *(Hijjal) (Baringtonia acutangula).* *51.* **Lythraceae:** Kumbhi *(Careya arborea).* *52.* **Lythraceae:** Dhataki *(Woodfordia fruticosa)* and Madayanti *(Lawsonia intermis).* *53.* **Punicaceae:** Dadima *(Punica granatum).* *54.* **Caricaceae:** Eranda karkati *(Carica papaya).* *55.* **Cucurbitaceae*:*** Devadali *(Luffa echinana),* Koshataki *(Luffa acutangula veriety amaru),*Indravaruni *(Citrullus colocynthis),* Karavillaka *(Momordica charantia),* Patola *(Trichosanthes cucumerina),* Bimbi *(Coccinia grandis),* Iksvak *(Lagenaria siceraria),*Kushmanda *(Benincasa hispida)* and Shivalingi *(Diplocyclos palmatus).* *56.* **Aizoaceae*:*** Varshabhu *(Trianthema portulacastrum).* *57.* **Apiaceae(Umbelliferave):** Mandukaparni *(Centella asiatica),* Satapushpa *(Anethum graveolens),* Dhanyaka *(Coriandrum sativum),* Jiraka *(Cuminum cyminum),* Madhurika *(Foeniculum vulgare),* Hingu *(Ferula foetida),* Krishanajiraka *(Carum carvi),* Yavani *(Trachyspermum ammi),* Chora *(Angelica glauca)* and Ajmoda *(Ammi majus).* *58.* **Araliaceae*:*** Ginseng *(Panax ginseng).* *59.* **Alangiaceae:** Ankol *(Alangium salvifolium).* *60.* **Rubiaceae:** Madana *(Catunaregam spinosa),* Manjistha *(Rubia cordifolia),* Kadamba *(Anthocephalus chinensis),* Gandha prasarini *(Paederia foetida),* Cinchona *(Cinchona officinalis),* Ipecacuanha *(Cephaelis ipecacuanha)* and Coffee *(Coffea Arabica).* *61.* **Valerianaceae*:*** Tagara *(Valeriana wallichii)* and Jatamansi *(Nardostachys jatamansi).* *62.* **Asteraceae (Compositae*):*** Akarkara *(Anacyclus pyrethrum / spilanthes calva),* Aranyajiraka *(Vernonia anthelmintica),* Bhringaraja *(Eclipta alba),* Kustha	

		(Saussurea lappa), Gojihva *(Elephantopus scaber),* Mundi *(Sphaeranthus indicus),* Rasna *(Pluchea lanceolata),* Puskar-mula *(Inula racemosa),* Sahadevi *(Vernonia cinerea),* Chauhara *(Artemisia maritime),* Kasani *(Cichorium intybus),* Kusumbha *(Carthamus tinctorius),* Ksavaka *(Centipeda minima)* and Dugdhapheni *(Taraxacum offcinale).* *63.* **Plumaginaceae:** Chitraka *(Plumbago zeylanica and allied species).* *64.* **Ericaceae:** Wintergreen oil plant *(Gaultheria fragrantissima).* *65.* **Myrsinaceae:** Vidanga *(Embelia ribes and allied species).* *66.* **Sapotaceae:** Madhuka *(Madhuca indica)* and Bakula *(Mimusops elengi).* *67.* **Ebenaceae:** Tinduka *(Diospyros peregrima).* *68.* **Styraceae:** Silhaka / Loban *(Styrax officinale).* *69.* **Symplocaeae:** Lodhra *(Symplocos racemosa).* *70.* **Oleaceae***:* Jati *(Jasminum officinale),* Mallika *(Jasminum sambac and allied species),* Parijata *(Nyctanthes arbortristis),* Vasuka *(Osmanthus fragrans),* Ghantapatali *(Schreberaswietenioides)* and Zayton *(Olea europaea).* *71.* **Salvadoraceae:** Pilu *(Salvadorapersica).* *72.* **Apocynaceae:** Kutaja / Indrtajava *(Holarrhena antidysenterica),* Sarpagandha *(Rauwolfiaserpentina),* Saptaparna *(Alstonia scholaris),* Sadapushpi *(Catharanthus roseus),* Karvira *(Nerium indicum),* Sariva bheda *(Ichnocarpus frutiscens),* and Ashphota *(Vallaris solanacea).* *73.* **Asclepiadaceae:** Arka / Alarka *(Calotropis gigantean and Calotropis procera),* Jivanti *(Leptadenia retuculatc),* Mirva *(Marsdenia tenacissima),* Mesha-shringi *(Gymnema sylvestre),* Soma-valli *(Sarcostemma acidum),* Swasha-vela *(Tylophora indica),* Yugmaphala *(Pergularia daemia)* and Arkapushpi *(Holostemma annularium).*	

17.	**Unit 4 Basics of cultivation**	Fundamentals of cultivation methods - Agro-climatic parameters, Propagation methods, Nursery Methods, Plant Protection Measures, Harvesting & Post Harvesting Management, etc.	14
	Total		**135**

Practicals:-

Systematic Identification and Study of External Characters of Part/s Used of Plants mentioned below :

1.

1**.** *Tinospora cordifolia, 2. Cocculus hirsutus, 3. Argemone mexicana, 4. Cleome gynandra, 5. Portulaca oleracea, 6. Abutilon indicum, 7. Hibiscus rosa - sinensis, 8. Corchorus depressus, 9. Fagonia cretica, 10. Oxalis corniculata, 11. Commiphora wightii, 12. Maytenus emarginata, 13. Cardiospermum halicacabum, 14. Zizyphus jujuba, 15. Moringa oleifera, 16. Clitoria ternatea, 17. Tephrosia purpurea, 18. Cassia spp., 19. Coccinia grandis, 20. Trianthema portulacastrum, 21. Centella asiatica, 22. Eclipta alba, 23. Plumbago zeylanica, 24. Jasminum officinale, 25. Catharanthus roseus, 26. Tylophora indica, 27. Trichodesma indicum, 28. Convolvulus microphyllus, 29. Withania somnifera, 30. Datura spp., 31. Solanum spp., 32. Bacopa monnieri, 33. Tecomella undulate, 34. Andrographis paniculata, 35. Phyla nodiflora.*

2. Study of Macroscopic (organoleptic) characters of part/s of plants specified for used in Ayurveda as described in various texts in detail**.**

3 Herbarium and Museum techniques:

Training in drying and processing of specimens for Herbarium and Museum of crude drugs**.** Identification, classification and preservation of specimens in Herbarium and Museum**.**

A well established Herbarium and Museum of raw drugs are indispensable for proper identification and authentication of plant specimens and crude drugs of doubtful identities**.**

4.Description and identification of important medicinal plants mentioned in theory.

5.Method of identification of medicinal plants.

6.Preparation of herbarium sheets of at list 50 plants.

Sl.No	Paper 4	Phytochemistry, Herbal Drug related technologies and development	135 Hrs
1.	**Unit 1 Natural plant products &Phyto-chemistry-**	Introduction to Phyto-chemistry. (2) Study of natural products like carbohydrates, alkaloids, fixed oils, fats, waxes, gums, resins, etc. and their medicinal and pharmaceutical importance. (3) Principles and methods of extraction and isolation of phytochemicals	4
		Instrumental methods of analysis of phytochemicals. Viz. Flame emission, Spectroscopy, Fluorimetry, Phosphorimetry, Turbidometry, Nephelometry, Phmetry and Refractrometry. (5) Fundamental studies in IR, UV, NMR Mass Spectrometry. (6) Paper, gas and thin layer chromatography. (7) Microbial and radioactive contaminations. (8) Standardization and quality control of medicinal plants/ their products etc.	
		I. Carbohydrates from plants **Soluble saccharides :** Madhu *(Honey).* **Polysaccharides :** Amruta satwa *(Tinospora cordifolia).* **Gums -** Babbula *(Acacia senegal and A. nilotica),* Mochras *(Salmalia malabarica)*, Ghatti gum *(Anogeissus latifolia),* Persian tragacanth *(Astragalus gummifer),* Indian tragacanth - Karaya gum *(Sterculia urens)*. **Mucilages -** • **Seed drugs:** Ashwagol *(Plantago ovata),* Kokilaksha *(Hygrophila spinosa),* Chandrashura *(Lepidium sativum),* Atasi *(Linum usitatissimum),* Methika *(Trigonella foenum - graecum),* Guar *(Cyamopsis tetragonoloba).* • **Other Drugs:** Kumari *(Aloe vera),* Brihat gokshura *(Pedalium murex).*	
2.		**II. Glycosides from important plants** • **Anthraquinones:** Swarnapatri *(Cassia senna),* Chakramard *(Cassia tora),* Aragwadha *(Cassia fistula),* Kumari *(Aloe vera),* Manjishta *(Rubia cordifolia),* Ravenchini *(Rheum emodi).* • **Cardiac:** Hritpatri *(Digitalis purpurea and D. lanata),* Karavira *(Nerium indicum),* Vanapalandu	5

		(Urginea indica). • **Saponins:** Satavari *(Asparagus racemosus)*, Safed musali *(Chlorophytum arundinaceum)*, Kebuka *(Costus speciosus)*, Chopchini *(Smilax china)*, Varahi kand *(Dioscorea bulbifera)*, Ingudi *(Balanites aegyptiaca)*, Gokshura *(Tribulus terrestris)*, Mandukparni *(Centella asiatica)*, Brahmi *(Bacopa monnieri)*, Yeshtimadhu *(Glycyerrhiza glabra)*, Aristaka *(Sapindus mukorossi)*, Apamarga *(Achyranthes aspera)*, Saptala *(Acacia concinna)*, Bharangi *(Clerodendrum serratum)*, Meshasringi *(Gymnema sylvestre)*, Ginseng *(Panax ginseng).* • **Cyanogenetic glycosides:** Kadu Badam *(Prunus amygdalas var. amara)*, Atasi *(Linum usitatissimum*), Padmakashta *(Prunus padam).* • **Isothiocynate - Glucosinolate glycosides:** Mustard *(Brassica nigra and B. Juncea).* • **Bitter glycosides:** Chirata *(Swertia chirata)*, Katuki *(Picrorhiza kurroa)*, Kalmegh *(Andrographis Paniculata)*, Tryamana *(Gentiana kurroa)*, Mamajjaka *(Enicostemma hyssopifolium)*, Karavellaka *(Momordica charantia).* • **Coumarin glycosides:** Bakuchi *(Psoralea corylifolia)* • **Flavone glycosides:** Yeshtimadhu *(Glycyrrhiza glabra)*, Bhallataka *(Semecarpus anacardium)*, Guchapatra *(Ruta graveolens).*	
3.		**III. Volatile oils - from plants** • **Leaf drugs:** Pudina *(Mentha arvensis)*, Tambula *(Piper betle)*, Tulasi *(Ocimum sanctum)*, Nirgundi *(Vitex negundo)*, Tamalapatra *(Cinnamomum tamala)*, Tailaparna *(Eucalyptus globules)*, Bhustrina *(Cymbopogon citratus).* • **Fruit drugs:** **Umbelliferous:** Ajowan *(Trachyspermum ammi)*, Dhanyaka *(Coriandrum sativum)*, Ajmoda *(Apium leptophyllum)*, Satapuspa *(Anethum sowa)*, Jirak *(Cuminum cyminum)*, Krishnajiraka *(Carum carvi)*, Mishreya *(Foeniculum vulgare)*, Ammi majus. **Others:** Badiyan (*Illicium verum)*,	4

		Lemon *(Citrus limon).* • **Seed drugs:** Suksma ela *(Elettaria cardamomum),* Sthulaila *(Amomum subulatum),* Jatiphala *(Myristica fragrans).* • **Bark drug:** Twak *(Cinnamomum verum).* • **Flower drugs:** Lavang *(Syzygium aromaticum),* Kesara *(Crocus sativus).* • **Underground drugs:** Puskarmula *(Inula racemosa),* Kustha *(Saussurea costus),* Tagar *(Valeriana jatamansi),* Usira *(Vetiveria zizanioides),* Jatamansi *(Nardostachys jatamansi),* Musta *(Cyperus rotundus),* Vacha *(Acorus calamus).* • **Wood drugs:** Devadaaru *(Cedrus deodara),* Chandana *(Santalum album).*	
4.		**I. Tannins from plants** Bibhitaka *(Terminalia belerica),* Haritaka *(Terminalia chebula),* Ashoka *(Saraca asoca),* Arjuna *(Terminalia arjuna),* Puga *(Areca catechu),* Jambu *(Syzygium cumini),* Dhataki *(Woodfordia fruticosa),* Khadira - Black catechu *(Acacia catechu),* Pale catechu *(Uncaria gambier),* Amalaki *(Emblica officinalis),* Mayafal *(Quercus infectoria).*	4
6.		Plant harmones - Introduction, Definition, Classification, Nomenclature, Source,importance, Structure, chemistry, structural elucidation of Auxins.	4
7.		Natural pigments - Introduction, Definition, Classification, Nomenclature, Sources, importance, Structure , chemistry ,	3
8.		Amino acid - Introduction, Definition, Classification , Nomenclature, Source,importance, Preparation and Properties of amino acids.	3
9.		Alkaloids – Introduction, Definition, Classification, Nomenclature, Sources, importance,Structure, chemistry,	5
10.	**Unit 2 - Drug standardization – in terms of Phyto-chemistry and Pharmacology**		
11.		General Introduction: Definition, source of herbal raw materials, identification, authentication, standardization of medicinal plants as per WHO guidelines & different herbal pharmacopoeias.	4
12.		Standardizations: Determination of physical and	4

		chemical constants such as extractive values, moisture content, volatile oil content, ash values, bitterness value and foreign matters applicable to the various herbal drugs.	
13.		Drug Research (Laboratory-based)- Basic knowledge of the following: Drug sources: plant, animal and mineral.	2
14.		Methods of drug identification.	2
15.	**Unit 3 Safety issues and Quality Control Measures.**	Quality control and standardization aspects: Basic knowledge of Pharmacopoeial standards and parameters as set by Ayurvedic Pharmacopoeia of India.	4
16.		Safety aspects: Protocols for assessing acute, sub-acute and chronic toxicity studies. Familiarization with AYUSH guidelines (Rule 170), CDCSO and OECD guidelines.	4
17.	**Unit 4. Herbal drug related Technologies and Development**	Methods of extraction, isolation and purification of phyto-constituents.	3
18.		HPLC, HPTLC and other advanced techniques.	3
19.		General methods of processing a herb - Definition, sources, identification and authentification of herbs; Different methods of processing of herbs like collection, harvesting, garbling, packing and storage conditions; Methods of drying – Natural and artificial drying methods with their merits and demerits	8
20.		Methods of preparation of herbal extract and essential oils - Principles of extraction and selection of suitable extraction method; Different methods of extraction including maceration, percolation, hot continuous extraction, pilot scale extraction and supercritical fluid extraction with their merits and demerits; Purification and Recovery of Solvents.	8
21.		Isolation and estimation of phyto-constituents.	3
22.	**Unit 5. Modern analytical techniques**		
23.	**Spectroscopic techniques**	UV-Visible Spectroscopy: Principle of UV-Visible Spectroscopy, Chromophores and their interaction with UV-visible radiation and their utilization in structural, qualitative and quantitative analysis of drug molecules. Fundamentals of Optical Rotatory Dispersion. Cotton effect curves, octant rule, circular dichroism.	8
24.		Infrared Spectroscopy: Infrared radiation and its interaction with organic molecules, vibrational mode of bonds, instrumentation and applications, interpretation of IR spectra. FTIR and ATR, X-ray diffraction methods	6

25.		Nuclear magnetic resonance spectroscopy: Magnetic properties of nuclei, field and precession, chemical shift concept, isotopic nuclei, reference standards and solvents. 1 H NMR spectra, chemical shifts, multiplicity, coupling constants, integration of signals, interpretation of spectra, decoupling-double resonance and shift reagent methods; APT and DEPT techniques.	8
26.	**Chromatographic techniques**	Chromatographic techniques: Principles of separation and application of Column, Paper, Thin layer and Gas chromatography, HPLC, HPTLC, Size exclusion chromatography, Affinity chromatography, Electrophoresis. Instrumentation of HPLC, Preparative and micropore columns, Reverse phase columns, Mobile phase selection and detectors in HPLC.	8
27.		Introduction to experimental pharmacology-knowledge of different animal models for assessing the plant safety and efficacy	5
	Total		**135 Hrs**

Practicals:-

1 Macroscopic and organoleptic studies of crude drugs with their adulterants and substitutes, mentioned under the above categories

2 Microscopic studies of the crude drugs underlined in the above lists.

Chemical tests of organized and unorganized drugs from the above list where ever they are applicable

Sl.No	Practical	540 Hrs
1.	Assessment of Plant Prakriti	2
2.	Determination of rasa panchaka in some common dravyas	4
3.	Introduction of various sections/departments of Ayurveda	14
4.	Clinical protocol writing exercise on a given problem	15
5.	Scientific article writing	5
6.	Identification of medicinal plants (medicinal plant garden visits 3 hrs per week)	90
7.	Microscopy of 30 medicinal plants	90
8.	Pharmacognostic and phytochemical evalution of 15 plants	90
9.	Practical related with plant pathology	10
10.	Different laboratory visits to understanding different techniques HPLC, HPTLC, Spectroscopic and chromatographic techniques	50
11.	Field visits for understanding cultivation techniques – 5 plants	50
12.	Practical training of extraction of different phytochemicals	50
13.	Practical training regarding different physicochemical parameters of plants	40

2nd Year

Sl.No	Paper 1	Basics of plant production , breeding And Organic farming – Ancient and modern methods	135 Hrs
1.	**Unit 1. Principles of Crop Production**	- Definition and scope of Agronomy,	3
2.		Classification of Crops on Different basis,	3
3.		General principles of Crop production : Climate, soil and its preparation, seed and seed sowing, post-sowing tillage, water management, nutrition, plant protection measures, harvesting, threshing and storage,	15
4.		Crop sequences and systems with emphasis on mixed cropping and inter cropping, etc.	5
5.	**Unit 2 Agricultural Meteorology -**		
		- Different meteorological variables related to agriculture,	10
6.		Rainfall-Hydrologic cycle and Its components,Types and forms of precipitation	8
7.		Humidity definetion,windwave,Anemometer	5
8.		Indian Agro Climatic Zones Elementary idea of wheather forecasting	5
11.	**Unit 3. Fundamentals of Soil Science**	According to surpala Definition of Soil, Components of Soil and their role in agriculture, ,	4
12.		Soil forming rocks and minerals, Development of Soil profile, Soil formation, factors affecting soil formation, soil forming processes	5
13.		Soil reaction and its measurements and significance,	5
14.		Physical properties of soil, and their significance, Chemical properties of soil, cation and anion exchange phenomenon and their importance in agriculture, etc.	10
15.	**Unit 4. Elementary Crop Physiology**	Principles and Practices of Soil Fertility and Nutrient Management	10
16.		Bio-Physico-chemical phenomenon-diffusion, osmosis plasmolysis and imbibitions, Absorption of water and mineral salts,	10
17.		Photosynthesis - light and dark reactions, etc.	5

18	**Unit 5-Organic farming- Ancient and modern techniques**	Definition, History, scope, and importance, Different Methods of organic farming	10
19.	**Unit 6. Principles of Plant Breeding**	- Plant Breeding-history, objectives and scope,	5
20.		Mode of reproduction in crop plants in relation to breeding techniques,	20
21.		Plant variation kind and causes, Genetic consequences of self and cross pollinated crops, etc	5
		Total	**135 Hrs.**

PRACTICALS :

1. Study of sexual characters of plants, needed for identification as per rule of Bentham and Hooker in details in relation to plants given above.
2. Study of external characters of part/s used mentioned with various texts in detail- in relation to plants given above.
3. Study of various methods of preservation of plants/ drugs like dry collection, wet collection etc- in relation to plants given above.
4. Study of herbariums and various plants preserved with herbaria from the collection of our Institutes- in relation to plants given above.
5. Study of external characters of different crude drugs available in market and collected as market samples from different pharmacies- in relation to plants given above.
6. Field study with ecological relationship of different medicinally important plants especially in wild and available in surrounding of Jaipur- in relation to plants given above.

Sl.No	Paper 2	Medicinal Plants Cultivation, Collection and Conservation	135 Hrs
1.	Unit 1. Conservation of medicinal Conservation	Need of conservation of medicinal plants, Types of conservation – in situ, ex situ	5
2.		Knowledge of Extinct, Endangered, Vulnareble species of medicinal plants and their conservation method	105
3.	Unit 2.	Cultivation & Conservation techniques of 100 selected medicinal plants 87. **Lamiaceae (Labiatae):** Tulsi *(Ocimum sanctum and allied species),* Putitha *(Mentha spicata and allied species),* Ajagandha *(Thymus serpyllum),* Salibia *(Salvia officinalis),* Dronapushpi *(Leucas cephalotes),* Pashan yavani *(Coleus amoinicus),* Zupha *(Hyssopus officinalis),* Lavander *(Lavendula vera)* and Tukhmalanga *(Lallemantia royleana).* 88. **Plantaginaceae:** Ishadgoala *(Plantago ovata).* 89. **Nyctaginaceae:** Punarnava *(Boerhaavia diffusa and allied species).*	

		90. **Amaranthaceae:** Apamarga *(Achayranthes aspera*), Gorakshaganja *(Aerva lanata),* Vituna *(Celosia argentia*) and Tanduliya *(Amranthus spinosus).* 91. **Chenopodiaceae:** Vastuk (Chenopodium album). 92. **Basellaceae:** Upodika *(Basella rubra)*. 93. **Polygonaceae:** Amlaparni *(Rheum australe = R.emodi)* and Amla-vetasa *(Rumex crispus).* 94. **Aristolochiaceae:** Ishvari *(Aristolochia indica*) and Kitamari *(Arustikicgua bracteolate).* 95. **Piperaceae:** Tambula *(Piper betle),* Chavika *(Piper chaba),* Pippali *(Piper longum),* Maricha *(Piper nigrum)* and Sugandha-Maricha *(Piper cubeba).* 96. **Myristicaceae:** Jatiphala *(Myristica fragrans and allied species).* 97. **Lauraceae:** Karpura (*Cinnamomum camphora),* Tavk-patra (*Cinnamomum tamala)*, and Tavk (*Cinnamomum zeylanicum).* 98. **Thymelaeaceae:** Agru (*Aquilaria agallocha).* 99. **Loranthaceae:** Bondaka (*Dendrophthoe falcate).* 100. **Santalaceae:** Chandana (*Santalum album).* 101. **Euphorbiaceae:** Arittanunjayrie (*Acalypha indica),* Danti (*Baliospermum montanum),* Jayaphala? (*Croton tiglium),* Amalaki (*Emblica officinalis),* Snuhi (*Euphorbia neriifolia),* Dugdhaika (*Euphobia hirta),* Kamplillaka (*Mallotus philippensis),* Lavaliphala (*Cicca acida),* Putranjiva (*Drypetes roxburghii),* Bhumyamalaki (*Phyllanthus fraternus and allied species)* and Eranda (*Ricinus conumunis).* 102. **Cannabinaceae:** Bhanga (*Cannabis sativa).* 103. **Ulmaceae:** Chira-bilva (*Holoptelea integrifolia).* 104. **Moraceae:** Panasa (*Artocarpus integrifolia),* Anjira (*Ficus carica),* Kakodumbara (*Ficus hispida),* Plaksha (*Ficus lactor and allied species),* Vata (*Ficus benghalensis),* Udumbara (*Ficus racemosa),* Asvatha (*Ficus religiosa)* and Shakhotaka (Strebulus asper). 105. **Juglandaceae:** Aksota (*Juglans regia).* 106. **Myricaceae:** kataphala (*Myrica esculenta).*	

		107. **Butelaceae:** Bhurja (*Betula utilis).* 108. **Fagaceae:** Mayaphala (*Quercus infectoria).* 109. **Salicaceae:** Vetasa (*Salix caprea).* 110. **Gnetaceae:** Soma (*Ephedra gerardiana).* 111. **Ginkgoaceae:** Ginkgo (*Ginkgo biloba).* 112. **Coniferae:** Talisha *(Abies spectabilis and allied species),* Sthoreyaka / Talisha (*Taxus wallichiana = taxus baccata),* Devadaru (*Cedrus deodara),* Sarala (*Pinus roxburghii),* Hapusha / Houber (*Junipwrus communis)* and Balsam (*Abies balsamea).* 113. **Orchidaceae:** Salap (*Orchis latifolia = Dactylorhiza hatagirea),* Jivaka (*Malaxis muscifera),* Rsabhaka (*Malaxis acuminate),* Rddhi (*Habenaria intermedia),* Vrdddhi (*Habenaria species)* and Salib- misri (*Eulophia campestris).* 114. **Zingiberaceae:** Kulinjana (*Alpinia galangal),* Brihat-ela (*Amomum subulatum),* Ela (*Elettaria cardamomum),* Arkraka (*Zingiber officinale),* Sati (*Hedychium spicatum),* Haridra (*Curcuma longa and allied species),* Kebuka (*Costus speciosus)* and Chandra-mulika (*Kampeferia galangal).* 115. **Iridaceae:** Keshara (*Crocus sativus*) 116. **Musaceae:** Kadali (*Musa paradisiaca*) 117. **Amaryllidaceae:** Sudarsana (*Crinum latifolium*) 118. **Hypoxidaceae:** Talmuli or Krisna Musali (*Curculigo orchioides*) 119. **Dioscoreaceae:** Varahikanda (*Dioscorea bulibifera* and allied species) 120. **Liliaceae:** Rasona (*Allium sativum*), Palandu (*Allium cepa*), Kumari (*Aloe barbadensis*), Shatavari (*Asparagus racemosus* and allied species), Sveta-Musali (*Chlorophytum tuberosum* and allied species), Langali (*Gloriosa superba*), Vanapalandu (*Urginea indica*), Dwipantara / Chopchini (*Smilax china* and Indian species), Hiranyatutha (*Colchicum luteum*), Kshira-Kakoli (*Fritillaria roylei*), Kakoli (*Lilium polyphyllum*), Meda (*Polygonatum verticillatum*), and Maha-Meda (*Polygonatum cirrhifolium*) 121. **Arecaceae (Palmae):** Tala (*Borassus flabellifer*), Narikela (*Cocos nucifera*), Kharjura (*Phoenix dactylifera*), Puga (*Areca catechu*) and Aklari (*Lodoicea maldivica*)	

		122. **Pandanaceae:** Ketaki (*Pandanus fascicularis*) 123. **Araceae:** Surana (*Amorphophallus campanulatus*), Vacha (*Acorus calamus*) and Kumbhika (*Pistia stratiotes*) 124. Cyperaceae: Mustha *(Cyperns rotundus)* and Kaseru *(Scirpus kysoor).* 125. **Poaceae (Graminae):** Ushira (*Vetiveria zizanioides*), Yava (*Hordeum vulgare*), Darbha (*Imperata cylindrica*), Kusha (*Desmostachya bipinnata*), Kasha (*Saccharum spontaneum*), Ikshu (*Saccharum officinarum*), Nala (*Arundo donax*), Munja (*Erianthus munja*), Vansha (*Bambusa arundinacea*), Dava (*Cynodon dactylon*), Kodarva (*Paspalum scorbiculatum*), Bhustrina (*Cymbopogon citratus*), Rosha (*Cymbopogon martinii*), Gavedhu (*Coix lachryma-jobi*), Sprakka (*Schizachyrium axile*) **126. Others material from lower groups of plants:** (1) Hanspadi (*Adiantum lunulatum*), Mayurasikha (*Actinopteris radiata),* Sunnishanuaka *(Marsilla minuta),* Lycopodium *(Lycopodium clavatum),* Male fern (*Dryopteris flix-mass*), Sayleia (*Parmelia perlata*), Ergot (*Claviceps purpurea*), Chatraka (*Agaricus campestris*), species of *Gracilaria fucus*, *Laminarea chondrus* etc- belonging to algae. (2) A brief account of medico-ethno botany and approaches to ascertain the medicinal value of the plant (3) Rare and endangered medicinal plants	
4.	Unit 3.	Good Agricultural & Collection Practices – GACP guidelines	15
5.	**Unit 4. Collection practices – Ancient and modern aspects**	Ancient method of plant collection - according to season and according to maturity of plant parts	5
6.		Modern methods of plant collection and storage of raw material	5

Practical

Macroscopic and organoleptic studies of crude drugs with their adulterants and substitutes, mentioned under the above categories.

Systematic Identification and Study of External Characters of Part/s Used for the plants mentioned below:

1. *Ocimum spp., 2. Boerhaavia diffusa, 3. Achayranthes aspera*, 4. *Amranthus spinosus, 5. Santalum album, 6. Acalypha indica, 7. Phyllanthus spp., 8. Ficus spp., 9. Crinum latifolium, 10. Asparagus racemosus*, *11. Cyperns rotundus, 12. Cynodon dactylon*, 13. *Marsilia minuta*

Sl.No.	Paper 3	Medicinal Plants Improvement and Phytopharmacutical studies	135 Hrs.
1.	**Unit 1.** Improvement of medicinal plants -	Ancient and modern methods for improvement of medicinal plants.	10
2.	**Unit 2.** Biotechnological Approaches and Agro-techniques for Medicinal Plants	Morden methods for imporvment of medicinal plants	5
3.	Cell and Tissue Culture	Plant tissue culture media, plant hormones and growth regulators in tissue culture, preparation of suitable explants - Immunodiagnostics and molecular diagnostics in selection of elite plant species - Callus culture, suspension cultures, embryo culture; anther, pollen and ovary cultures. Micropropagation of plants - somatic embryogenesis, protoplast culture, somatic hybridization and synthetic seeds.	15
4.	**Unit 3. Phyto - Pharmaceutical studies**	Alkaloids, Resins, and Lipids containing drugs and other topics. **Alkaloids** Introduction - Definition, distribution, properties, classification, tests, uses etc. **I.** Drugs containing true - Heterocyclic - alkaloids. 1. **Pyridine, piperidine -** Dadima *(Punica granatam),* Marich *(Piper nigrum),* Pippali *(Piper longum),* Aswagandha *(Withania somnifera).* 2. **Tropane -** Dhattura *(D. metel var. fastuosa, D. innoxia, D.),* Parasikayavani *(Hyoscyamus niger).*	85

			85

3. **Pyridine, piperidine -** Dadima *(Punica granatam),* Marich *(Piper nigrum),* Pippali *(Piper longum),* Aswagandha *(Withania somnifera).*

4. **Tropane -** Dhattura *(D. metel var. fastuosa, D. innoxia, D.)*, Parasikayavani *(Hyoscyamus niger).*

5. **Isoquinoline -** Aphim *(Papaver somniferum),* Daruharidra *(Berberis aristata)*, Patha *(Cissampelos pareira),* Kamla *(Nelumbo nucifera),* Ishwari *(Aristolochia indica).*

6. **Indole -** Sarpagandha *(Rauwolfia serpentina),* Kupilu *(Strychnos nuxvomica),* Sadapuspa *(Catharanthus roseus),* Gunja *(Abrus precatorius),* Arkaparni *(Tylophora indica)*, Saptaparni *(Alstonia scholaris).*

7. **Quinazoline -** Vaasa *(Adhatoda zeylanica),* Mahabala *(Sida rhombifolia).*

8. **Steroidal -** Kutaj *(Holarrhena antidysentrica),* Brhati *(Solanum indicum),* Kantakari *(Solanum xanthocarpum),* Kakamaci *(Solanum nigrum).*

9. **Terpenoid -** Chakshusya *(Cassia absus),* Ativisa *(Aconitum heterophyllum),* Vatasanabha *(Aconitum chasmanthum).*

II. Drugs Containing - Nonheterocyclic - Proto alkaloids

Langali *(Gloriosa suberba)* Soma *(Ephedra),* Bala *(Sida cordifolia),* Shaalparni *(Desmodium gangeticum),* Parpata *(Fumaria indica).*

		III. Drugs Containing - Pseudo alkaloids Sthauneyaka *(Taxus wallichiana),* Dadima *(Punica granatum).* **Resins and Resin Combinations** Introduction - Definition, properties, compositions, storage organs etc. **I. Organized drugs - Roots and rhizomes -** Sunthi *(Zingiber officinale),* Chandramulika *(Kaempferia galanga),* Haridra *(Curcuma longa),* Sati *(Hedychium spicatum),* Kulinjan *(Alpinia galanga),* Murva *(Marsdenia tenacissima),* Trivrit *(Merremia turpethum),* Vridhadaruka *(Argyreia nervosa);* **Flower -** Nagkesar *(Mesua ferrea);* **Flowering and Fruiting tops -** Vijaya *(Cannabis sativa);* **Fruit Drugs -** Vidang *(Embelia ribes),* Kampillak *(Mallotus philippinensis),* Kankol *(Piper cubeba),* Aranyajiraka *(Vernonia anthelmintica);* **Seed Drug -** Kaladana *(Ipomoea hederaceae).* **II. Unorganized Drugs -** Hingu *(Ferula asafoetida),* Nadihingu *(Gardenia lucida),* Saral *(Pinus roxburghii),* Shallaki *(Boswellia serrata),* Guggulu *(Commiphora wightii),* Heerabol *(Commiphora myrrha),* Khoon - khrabha *(Doemonorops propinquus).* **Fixed oils, Fats and waxes.** Introduction - Definition, classification properties, uses etc. **I. Seed Drugs -** Atasi *(Linum usitatissimum),* Sarshapa *(Brassica campestris),* Eranda *(Ricinus communis),* Karanja *(Derris indica),* Jyotishmati *(Celastrus paniculatus),* Nimba *(Azadirachta indica),* Til *(Sesamum indicum),* Tuvaraka *(Hydnocarpus laurifolia).* **II. Waxes -** Madhuchista - *(Bees wax).*	
6.	**Unit 4.** Introduction to organizations	National Medicinal Plants Board, Central Institute of Medicinal and Aromatic Plants, Food and Agriculture Organization etc.	10
7.		Contribution of national research laboratories (CDRI, CIMAP,RRC,AND NBRI) in medicinal plants	10
	Total		**135 Hrs.**

Sl.No	Paper 4	Medicinal Plants - Trading, Funding, Entrepreneurship and legal issues	135 Hrs.
1.	**Unit 1.** Trading and Economics of medicinal plants.	Marketing and utilization - Export of medicinally important plants (General aspects),	4
2.		Market intermediaries and their role - Need for regulation in the present context	4
3.		Problems in medicinal plant Marketing from Demand and Supply and Institutions sides. - Marketing Efficiency -	10
4.		Structure Conduct and Performance analysis - Vertical and Horizontal integration – Integration over space, time and form-Vertical co-ordination,	10
5.		Direct marketing, - Contract farming and Retailing - Supply Chain Management - State trading, Warehousing and other Government agencies	10
6.		Performance and Strategies - Market infrastructure needs, performance and Government role	10
7.		Performance analysis of Regulated market and marketing societies. Analysis on contract farming and supply chain management of different medicinal plants	10
8.		Chain Analysis - quantitative estimation of supply chain efficiency - Market Intelligence – Characters, Accessibility, and Availability Price forecasting.	10
9.		Online searches for market information sources and interpretation of market intelligence reports	10
10.	**Unit 2.** Knowledge of funding sources	Banking and sources of finance, working capital management, costing and pricing, Insurance etc	10
	Legal issues regarding collection and cultivation practices.	Biopiracy Intellectual Property Rights and patents Pharmacovigilance	
11.	**Unit 3.** Entrepreneurship and management.		
12.	Entrepreneurship	Introduction to Entrepreneurship, Concept, characteristics of entrepreneur, types and functions of entrepreneur, difference between entrepreneur and a manager. knowledge of achievement motivation and positive psychology, risk assessments, SWOT analysis etc.	12
13.	Management	The Business – Its Nature and Scope Meaning, characteristics, objectives and scope of business, difference between business and profession, interrelationship between industry, commerce and trade	10

14.		Fundamentals of Management : Meaning, characteristics, difference between management and administration, management process, working capital management, inventory management, human resource management, production and operation management, marketing management. Accounting need, meaning, objectives, journal, ledger, trial balance, final accounts- profits and loss accounts,	15
	Total		**135 Hrs**

Sl.No	Practical	540 Hrs.
1.	Dissertation on Selected Topic	300
2.	Crop Field Visits for Minimum 15 Plants	150
3.	Practical for Conservation Techniques for Minimum 15 Plants	75
4.	Practical Training regarding Collection of Medicinal Plants	15
	Total	**540 Hrs**