Curriculum for MD/ MS Ayurveda
(PRESCRIBED BY NCISM)

अभ्यासात्प्राप्यते दृष्टिः कर्मसिद्धिप्रकाशिनी।

Semester II
Applied Basics of Dravyaguna Vijnana
(Ayurveda Pharmacology)
(SUBJECT CODE : AYPG-AB-DG)

(Applicable from 2024-25 batch, from the academic year 2024-25 onwards until further notification by NCISM)

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आयुषे सर्वलोकानाम्

BOARD OF AYURVEDA
NATIONAL COMMISSION FOR INDIAN SYSTEM OF MEDICINE
NEW DELHI-110026

PREFACE

Dravyaguna, a key pillar among the Trisutras of Ayurveda, focuses on understanding the properties, actions, and uses of medicinal substances, especially herbs. This subject has deep roots in the classical texts and is enriched by references found even in the Vedas. The postgraduate syllabus of Dravyaguna is designed to give detailed knowledge of Aushadha Dravya, covering their Rasapanchaka, Karma, Prayojya Anga, and relevance in different clinical conditions. The aim is to help students study medicinal plants thoroughly—from identification and classification to therapeutic application—keeping in view their classical importance and current healthcare needs.

This curriculum includes topics that link Ayurveda with modern science. Students are introduced to concepts from botany, pharmacognosy, analytical chemistry, pharmacology, omics technologies, and bioinformatics to understand the deeper mechanisms of drug action. Practical learning through experimental pharmacology, identification of adulterants and substitutes, pharmacovigilance, quality control, and research on proprietary medicines has been included to give students hands-on experience. Modules on network pharmacology, nutraceuticals, novel dosage forms, and integration of traditional and modern approaches further prepare them to handle current-day challenges.

The syllabus also encourages learning about medicinal plant conservation, cultivation, trade, and regulation. With exposure to patent laws, TKDL, AYUSH policies, and opportunities for entrepreneurship, students are encouraged to explore independent paths in research, industry, or clinical practice. By the end of the program, students will have a strong understanding of classical knowledge, modern tools, and practical skills to contribute meaningfully to the field of Dravyaguna and Ayurveda in both national and global contexts.

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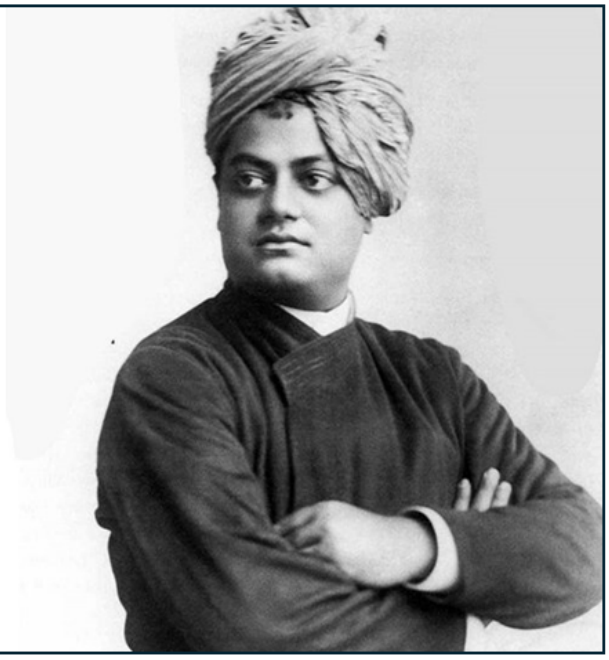
We want that education by which **character** is formed, **strength of mind** is increased, the **intellect** is expanded, and by which one can **stand on one's own feet.**

-Swami Vivekananda



NCISM

(NATIONAL COMMISSION FOR INDIAN SYSTEM OF MEDICINE)

Curriculum for MD/ MS Ayurveda

Applied Basics of Dravyaguna Vijnana (AYPG-AB-DG)

Summary & Credit Framework

Semester II

Module Number & Name	Credits	Notional Learning Hours	Maximum Marks of assessment of modules (Formative assessment)
M1. Digital databases and tools for Dravyaguna: Data mining, analysis and application	3	90	75
M2. Instruments and Equipment used in Quality control of medicinal plants in Dravyaguna	3	90	75
M3. Introduction to Experimental Pharmacology	2	60	50
M4. Guna and their pharmacotherapeutics	3	90	75
M5. Rasa and their pharmacotherapeutics	2	60	50
M6. Vipaka and their pharmacotherapeutics	2	60	50
M7. Virya and Prabhava and their pharmacotherapeutics	1	30	25
	16	**480**	**400**

Credit frame work

AYPG-AB-DG consists of 7 modules totaling 16 credits, which correspond to 480 Notional Learning Hours. Each credit comprises 30 hours of learner engagement, distributed across teaching, practical, and experiential learning in the ratio of 1:2:3. Accordingly, one credit includes 5 hours of teaching, 10 hours of practical training, 13 hours of experiential learning, and 2 hours allocated for modular assessment, which carries 25 marks.

Important Note: The User Manual MD/MS Ayurveda is a valuable resource that provides comprehensive details about the curriculum file. It will help you understand and implement the curriculum. Please read the User Manual before reading this curriculum file. The curriculum file has been thoroughly reviewed and verified for accuracy. However, if you find any discrepancies, please note that the contents related to the MSE should be considered authentic. In case of difficulty and questions regarding the curriculum, write to syllabus24ayu@ncismindia.org.

Course Code and Name of Course

Course code	Name of Course
AYPG-AB-DG	Applied Basics of Dravyaguna Vijnana

Table 1 : Course learning outcomes and mapped Program learning outcomes

CO No	A1 Course learning Outcomes (CO) AYPG-AB-DG At the end of the course AYPG-AB-DG, the students should be able to-	B1 Course learning Outcomes mapped with program learning outcomes.
CO 1	Analyze and interpret the fundamental principles and mechanisms of Ayurvedic pharmacology and contemporary science, and apply them in clinical practice.	PO1,PO3,PO7,PO8
C02	Identify, classify, and evaluate medicinal plants and conduct their pharmacognostic study as per Ayurveda and contemporary science.	PO1,PO2,PO3,PO7
CO3	Develop critical thinking to differentiate anukta, controversial, adulterant, and substitute dravyas, and apply this understanding in clinical practice.	PO1,PO3,PO7,PO8
CO4	Appraise techniques for the development of quality-standardized plant-based drugs and their formulations, and validate their safety and efficacy using advanced analytical tools.	PO1,PO2,PO5,PO7
CO5	Acquire and assess knowledge of various formulations and their therapeutic utility in clinical practice.	PO1,PO3,PO7
CO6	Demonstrate techniques of ethnomedicinal research and implement strategies for medicinal plant conservation, following professional ethics aligned with global healthcare needs.	PO4,PO5,PO6,PO8
CO7	Analyze the global trade and commerce of medicinal plants, evaluate regulatory frameworks, and assess their impact on sustainable practices.	PO5,PO6,PO8
CO8	Examine and interpret the significance and application of IPR in traditional and invention-based knowledge systems.	PO3,PO5,PO8
CO9	Explore, retrieve, and utilize information from various databases, ancient texts, and contemporary literature related to medicinal plants.	PO1,PO5,PO7

Table 2 : Course contents (Modules- Credits and Notional Learning Hours)

2A Module Number	2B Module & units	2C Number of Credits	Notional Learning hours			
			2D Lectures	2E Practical Training	2F Experiential Learning including modular assessment	2G Total
1	**M-1 Digital databases and tools for Dravyaguna: Data mining, analysis and application** This module deals with the Digital databases and tools used for data mining, analysis and application in Dravyaguna • **M1U1 Secondary metabolites in medicinal plants** Significance of secondary metabolites in medicinal plants • **M1U2 Databases for predicting structural relationships** Various databases used in medicinal plant research for predicting structural relationships • **M1U3 Databases for predicting functional relationships** Various databases used in medicinal plant research for predicting functional relationships	3	15	30	45	90

2	**M-2 Instruments and Equipment used in Quality control of medicinal plants in Dravyaguna** This module helps to be acquainted with the principles,calibration,standard operating procedures ,methodology,analysis,utility and interpretation of Instruments and Equipment used in Quality control of medicinal plants in Dravyaguna • **M2U1 Instruments and equipment in Analytical pharmacognosy** Instruments and equipment employed in Analytical pharmacognosy • **M2U2 Instruments and equipment for advanced Analytical methods** Instruments and equipment employed for Advanced Analytical methods	3	15	30	45	90
3	**M-3 Introduction to Experimental Pharmacology** This module gives a broad overview of the prerequisites and screening methods used in preclinical/ Invivo research. • **M3U1 Laboratory Animals** Commonly used laboratory animals and screening methods • **M3U2 Preclinical screening models & Computer aided learning** Preclinical screening models & Computer aided learning	2	10	20	30	60

4	**M-4 Guna and their pharmacotherapeutics** This module deals with the comprehensive study of Gurvadi, Paradi, Vaisheshika and Adhyatma gunas with commentators' views and their applied aspects, Biophysical and Biochemical approach to understand Gunas and analysing the pharmacodynamics based on quality attributes. • **M4U1 Gurvadi Guna** 20 Gurvadi Guna • **M4U2 Paradii Guna** 10 Paradii Guna • **M4U3 Vishishta Guna & Adhyatma Guna** 5 Vishishta Guna & 6 Adhyatma Guna	3	15	30	45	90
5	**M-5 Rasa and their pharmacotherapeutics** This module deals with the comprehensive study of Shadrasa with commentators' views and their applied aspects, elucidating the relation of Rasa with phytoconstituents and assessment of Rasa by taste threshold method and other advanced methods. • **M5U1 Shadrasa**	2	10	20	30	60

	Shadrasa					
6	**M-6 Vipaka and their pharmacotherapeutics** This module deals with comprehensive study of Vipaka with commentators' views and their applied aspects, understanding vipaka in relation to gut microbiota with documented evidences and different methods to analyze Vipaka. • **M6U1 Vipaka** Vipaka	2	6	30	24	60
7	**M-7 Virya and Prabhava and their pharmacotherapeutics** This module deals with the comprehensive study of Virya with commentators' views and their applied aspects, analysing Virya on the basis of active constituents and assessment of Virya by different methods. It also deals with Prabhav in Ayurveda and modern scientific context, analysing the differences between Prabhava (Specific pharmacological effect) and general pharmacological effects. • **M7U1 Veerya** Veerya • **M7U2 Prabhava**	1	5	10	15	30

	Prabhava					
		16	**76**	**170**	**234**	**480**

Table 3 : Modules - Unit - Module Learning Objectives and Session Learning Objective- Notional Learning Hours- Domain-Level- TL Methods

3A Course Outcome	3B Learning Objective (At the end of the (lecture/practical training /experiential learning) session, the students should be able to)	3C Notional learning Hours	3D Lecture/ Practical Training/ Experiential Learning	3E Domain/ Sub Domain	3F Level (Does/Shows how/Knows how/Know)	3G Teaching Learning Methods
Module 1 : Digital databases and tools for Dravyaguna: Data mining, analysis and application						
Module Learning Objectives **(At the end of the module, the students should be able to)** 1. Identify and explore various databases available for medicinal plants. 2. Perform a basic search of various databases to predict mechanistics of drug action 3. Interpret the extracted data and its application.						
Unit 1 Secondary metabolites in medicinal plants Significance of secondary metabolites in medicinal plants **References:** 1,2,3,4						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO 1,C02,CO4,CO 9	Analyze the therapeutic utility of secondary metabolites of medicinal plants, and explore databases such as CSIR-Plant Metabolome, Phytohub, OSADHI, and IMPPAT for relevant information.	5	Lecture	CAN	Knows-how	D,L&GD, L&PPT ,L _VC,TUT
CO 1,C02,CO4,CO	Perform searches using medicinal plant databases such as CSIR-Plant Metabolome, Phytohub, OSADHI, and IMPPAT to identify phytoconstituents and predict their	10	Practical Training 1.1	PSY-GUD	Knows-how	D,DIS,W

9	mechanisms of drug action.					
CO 1,C02,CO4,CO 9	Interpret the extracted data from databases related to secondary metabolites and its application.	10	Experiential-Learning 1.1	PSY-GUD	Does	D,LS,Mnt ,ML,PAL
CO 1,C02,CO4,CO 9	Interpret the extracted data from databases related to secondary metabolites and its application.	3	Experiential-Learning 1.2	PSY-GUD	Does	D,LS,Mnt ,ML,PAL
Unit 2 Databases for predicting structural relationships Various databases used in medicinal plant research for predicting structural relationships **References:** 5,6,7,8,9,10						
3A	**3B**	**3C**	**3D**	**3E**	**3F**	**3G**
CO 1,C02,CO4,CO 9	Identify and interpret structural relationships among chemical compounds, plant proteins, metabolites, and associated disease-gene linkages using medicinal plant research databases.	5	Lecture	CAN	Knows-how	L&GD,L &PPT ,L_ VC,TUT
CO 1,C02,CO4,CO 9	Demonstrate the databases using tutorials used in identification of chemical compounds, plant proteins and metabolites along with associated disease -gene linkages.	10	Practical Training 1.2	PSY-GUD	Shows-how	D,DIS,M L,PT
CO 1,C02,CO4,CO 9	Interpret the extracted data from databases related to identify proteins/ metabolites	10	Experiential-Learning 1.3	PSY-GUD	Does	D,DIS,JC, Mnt,ML,P L
CO 1,C02,CO4,CO	Interpret the extracted data from databases related to identify proteins/ metabolites from the available profile of LCMS data of that plant/drug.	3	Experiential-Learning 1.4	PSY-GUD	Does	D,DIS,JC, Mnt,ML,P

9						L

Unit 3 Databases for predicting functional relationships

Various databases used in medicinal plant research for predicting functional relationships

References: 11,12,13,14,15,16,17,18

3A	3B	3C	3D	3E	3F	3G
CO 1,C02,CO4,CO 9	Identify and interpret functional relationships using databases employed in medicinal plant research.	5	Lecture	CAN	Knows-how	L,L&GD, L&PPT ,L_VC
CO 1,C02,CO4,CO 9	Demonstrate the databases used in medicinal plant research for predicting functional relationships using tutorials.	10	Practical Training 1.3	PSY-GUD	Shows-how	C_L,D,D L,ML,PT
CO 1,C02,CO4,CO 9	Interpret the extracted data from databases for predicting functional relationships	10	Experiential-Learning 1.5	PSY-GUD	Does	BS,C_L,D ,DIS,JC, Mnt,PAL
CO 1,C02,CO4,CO 9	Interpret the extracted data from databases for predicting functional relationships	3	Experiential-Learning 1.6	PSY-GUD	Does	BS,C_L,D ,DIS,JC, Mnt,PAL

Practical Training Activity

Practical No	Name	Activity details
Practical Training 1.1	Demonstration of the available databases comprising information on secondary	Demonstrate the database of CSIR- https://plantmetabolome.cdri.res.in/ emphasizing general search and mass spectrometry based search. Demonstrate the database of Phytohub https://phytohub.eu/search/compounds emphasizing compound based search Demonstrate the database of OSADHI, An online structural and analytics based database for herbs of

	metabolites	India https://neist.res.in/osadhi/index.html Demonstrate the database of IMPPAT- https://cb.imsc.res.in/imppat/
Practical Training 1.2	Demonstration and identification of proteins/ metabolites from the databases.	Demonstrate and identify proteins/ metabolites from the available profile of LCMS data of that plant/drug and later to link with various disease genes. Pubchem (chemical structure database for compounds) HMBD (database of metabolites) Uniprot (database of proteins and biological functions) STRING (Protein database) GeneCards (information on disease, genes and pathways) Venny (for checking similarity ad dissimilarity in compounds)
Practical Training 1.3	Demonstration of predicting the interactions/disease pathways	Demonstrate the prediction of interactions/disease pathways using the selected metabolite/ protein (withanolides, curcumin, quercetin, bacoside, epicatechin, gallate, etc) using following databases- KeGG, (molecular pathways) Reactome (Pathway databases) PANTHER (protein pathway analysis) BindingDB (for measuring binding affinities for protein interactions) DINIES- Drug-target Interaction Network Inference Engine based on Supervised Analysis
Experiential learning Activity		
Experiential learning No	**Name**	**Activity details**
Experiential-Learning 1.1	Identification of classes of compounds as per different Rasa and comparison of chemical structures of phytoconstituents of Rasa	Appreciate the various classes of compounds in the following- Madhura rasa predominant drugs Katu Rasa predominant drugs Tikta Rasa predominant drugs Amla Rasa predominant drugs Kashaya Rasa predominant drugs [Teacher can assign 2/2 drugs of specific Rasa to students for finding out the secondary metabolite class] Compare the chemical structures of phytoconstituents of specific rasa of selected drugs. (minimum 3) [five of each group- Teacher may provide the drug names suitably for the activity; Students may prepare a presentation after reading papers on the same.]

		Webinar from experts OR Journal club
Experiential-Learning 1.2	Identification of classes of compounds as per different Rasa and comparison of chemical structures of phytoconstituents of Rasa.	Appreciate the various classes of compounds in the following- Madhura rasa predominant drugs Katu Rasa predominant drugs Tikta Rasa predominant drugs Amla Rasa predominant drugs Kashaya Rasa predominant drugs [Teacher can assign 2/2 drugs of specific Rasa to students for finding out the secondary metabolite class] Compare the chemical structures of phytoconstituents of specific rasa of selected drugs. (minimum 3) [five of each group- Teacher may provide the drug names suitably for the activity; Students may prepare a presentation after reading papers on the same.] Webinar from experts OR Journal club
Experiential-Learning 1.3	Comparison of the chemical structures of phytoconstituents as per skandha/varga	Compare the chemical structures of phytoconstituents of various skandhas/varga/gana attributed with Karma (2 each) [Mrudvika, Yashtimadhu -madhura skandhas]; Vrikshamla, amlika- amla skandhas]; [Pippali, Bhallataka- Katu skandha]; [Katuki, Guduchi, Patola- Tikta skandhas]; Shirish, Khadira – Kashaya skandhas]. Webinar, Journal club
Experiential-Learning 1.4	Compare the chemical structures of phytoconstituents as per skandha/varga	Compare the chemical structures of phytoconstituents of various skandhas/varga/gana attributed with Karma (2 each) [Mrudvika, Yashtimadhu -madhura skandhas]; Vrikshamla, amlika- amla skandhas]; [Pippali, Bhallataka- Katu skandha]; [Katuki, Guduchi, Patola- Tikta skandhas]; Shirish, Khadira – Kashaya skandhas]. Webinar, Journal club
Experiential-Learning 1.5	Interpret the extracted data from databses used for the prediction of interactions/disease pathways using the selected metabolite/	Appreciate the srotasa wise identified single plant drugs and studying their interactions by using databases. (Teacher may provide 2/3 plants specific to srotasa to the students and help them in studying different inetractions using these pathways) Some examples of metabolites include:(withanolides, curcumin, quercetin, bacoside, epicatechin, gallate, etc) KeGG, (molecular pathways) Reactome (Pathway databases)

	protein	PANTHER (protein pathway analysis) BindingDB (for measuring binding affinities for protein interactions) DINIES- Drug-target Interaction Network Inference Engine based on Supervised Analysis Explore the therapeutic action of drugs on various systems with same rasa using above databases. OR Webinar; Journal club
Experiential-Learning 1.6	Interpretation of the extracted data from databses used for the prediction of interactions/disease pathways using the selected metabolite/ protein	Appreciate the srotasa wise identified single plant drugs and studying their interactions by using databases. (Teacher may provide 2/3 plants specific to srotasa to the students and help them in studying different inetractions using these pathways) Examples of metabolites:(withanolides, curcumin, quercetin, bacoside, epicatechin, gallate, etc) KeGG, (molecular pathways) Reactome (Pathway databases) PANTHER (protein pathway analysis) BindingDB (for measuring binding affinities for protein interactions) DINIES- Drug-target Interaction Network Inference Engine based on Supervised Analysis Explore the therapeutic action of drugs on various systems with same rasa using above databases.(Te OR Webinar; Journal club

Modular Assessment

Assessment method	**Hour**
Instructions- Conduct a structured Modular assessment. Assessment will be for 75 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. • Pre-post Questionnaire - A list of MCQ type questions may be given to students before teaching the respective unit as pre-assessment. Later, after completion of portion of individual units, the same questionnaire may be circulated by changing the sequence or framing of questions as a part of post assessment.- 25 marks • Mini Test : Practical on any one database by posing questions (any 1 from each unit)-25 Marks • Project-Based Assessments: Student will be assigned some small project/task on exploring particular class of secondary metabolites vis a vis Rasa. Exploring similarities in 2-3 dravyas of a skandhas by searching information on a particular phytoconstituent pertaining to its chemical structure, plant proteins and metabolites along with associated disease -gene linkages and interpretation based on dravyaguna fundamentals covering all three units of	6

Module 1 -25 Marks Or Any practical in convenient form can be taken for assessment- 45 marks- and Any of experiential learning can be taken for assessment -30 marks	

Module 2 : Instruments and Equipment used in Quality control of medicinal plants in Dravyaguna

Module Learning Objectives
(At the end of the module, the students should be able to)

1.Discuss the principles, calibration , standard operating procedures , analysis, utility of the Instruments and equipment used in Dravyaguna
2.Demonstrate the methodology, standard operating procedures and calibration of the Instruments and equipment employed in Dravyaguna
3.Participate and apply the principles, calibration, standard operating procedures, analysis, utility with interpretation of the Instruments and equipment employed in Dravyaguna

Unit 1 Instruments and equipment in Analytical pharmacognosy

Instruments and equipment employed in Analytical pharmacognosy

References: 19,20,21,22,23,24,25,26,27,28

3A	3B	3C	3D	3E	3F	3G
CO4	Discuss the principles, calibration , standard operating procedures , analysis, utility of the Instruments and equipment employed for Analytical pharmacognosy	10	Lecture	CC	Knows-how	L,L&GD, L&PPT ,L_VC
CO4	Demonstrate the calibration, standard operating procedures,analysis,utility and interpretation of the Instruments and equipment employed for Analytical pharmacognosy	10	Practical Training 2.1	PSY-GUD	Shows-how	D,DL,DIS ,TBL
CO4	Demonstrate the calibration, standard operating procedures,analysis,utility and interpretation of the Instruments and equipment employed for Analytical pharmacognosy	10	Practical Training 2.2	PSY-GUD	Shows-how	D,DL,DIS ,TBL
CO4	Participate and apply the principles, calibration , methodology as per standard operating procedures ,utility with interpretation of the Instruments and equipment employed for	8	Experiential-Learning 2.1	AFT-VAL	Shows-how	FV,LS,M L,PBL,Pr

	Analytical pharmacognosy					BL
CO4	Participate and apply the principles, calibration , methodology as per standard operating procedures ,utility with interpretation of the Instruments and equipment employed for Analytical pharmacognosy	10	Experiential-Learning 2.2	AFT-VAL	Shows-how	FV,LS,ML,PBL,PrBL
CO4	Participate and apply the principles, calibration , methodology as per standard operating procedures ,utility with interpretation of the Instruments and equipment employed for Analytical pharmacognosy	8	Experiential-Learning 2.3	AFT-VAL	Shows-how	FV,LS,ML,PBL,PrBL

Unit 2 Instruments and equipment for advanced Analytical methods

Instruments and equipment employed for Advanced Analytical methods

References: 19,20,21,22,23,24,25,26,27,28

3A	3B	3C	3D	3E	3F	3G
CO4	Discuss the principles, calibration , standard operating procedures ,methodology of analysis, utility and interpretation of the Instruments and equipment employed for Advanced Analytical methods	5	Lecture	CC	Knows-how	L,L&GD,L&PPT,L_VC
CO4	Demonstrate the calibration , standard operating procedures ,methodology of analysis, ,utility and interpretation of the Instruments and equipment employed for Advanced Analytical methods	10	Practical Training 2.3	PSY-GUD	Shows-how	D,DL,DIS,TBL
CO4	Participate and apply the principles, calibration , standard operating procedures ,methodology of analysis, utility and interpretation of the Instruments and equipment employed for Advanced Analytical methods	10	Experiential-Learning 2.4	AFT-VAL	Shows-how	FV,LS,ML,PBL,PrBL
CO4	Participate and apply the principles, calibration , standard operating procedures ,methodology of analysis, utility and interpretation of the Instruments and equipment	3	Experiential-Learning 2.5	AFT-VAL	Shows-how	FV,LS,ML,PBL,Pr

	employed for Advanced Analytical methods					BL

Practical Training Activity

Practical No	Name	Activity details
Practical Training 2.1	Demonstrate the techniques of the Instruments and equipments employed for Analytical pharmacognosy.	The teacher will demonstrate the operating procedure and discuss the utility of the following Instruments and equipment 1. Microscope– Dissecting microscope Binocular with built in illumination, Trinocular with digital camera; Fluorescence inverted microscope with software 2. Magnification lens with light 3. Digital weighing machine 4. Microbalance 5. Analytical balance - Digital High precision(0.0001g-220g) 6. Hot Air oven 7. Humidity control oven 8. Muffle Furnace 9. Dessicator 10. Reflux condenser 11. Pycnometer 12. Digital pH meter 13. Optic Abbe's Refractometer 14. Ostwald's Viscometer 15. Moisture analyser balance 16. Rotary Microtome and Microtome Object Holder 17. Homogeniser 18. Heating mantle
Practical Training 2.2	Demonstrate the techniques of the Instruments and	The teacher will demonstrate the operating procedure and discuss the utility of the following Instruments and equipment 19. Digital Thermometer 20. Digital melting point apparatus

	equipments employed for Analytical pharmacognosy	21. Water still 22. Magnetic stirrer 23. Soxhlet apparatus 24. Sonicator 25. Clevenger's apparatus 26. Filtration equipment 27. Rotary evaporator 28. Freeze dryer (Lypophilizer) 29. Incubator and shaker 30. Water Bath 31. Distillation apparatus 32. Fraction collector 33. Bulk density 34. Stability chamber 35. Centrifuge 36. Autoclave
Practical Training 2.3	Operations and applications of the Instruments and equipment used with Chromatographic , Spectrophotometric and in molecular biology and immunoassay techniques	The teacher will demonstrate the operating procedure and utility of the following Instruments and equipment in person or through videos 1.Chromatographic techniques-TLC ,HPLC, GCMS, LCMS, 2.Spectrophotometric techniques - Spectrophotometer, Centrifuge ,UV-Vis Spectrophotometer, Flame photometry,Infra Red Spectroscopy ,Nuclear Magnetic Resonance Spectroscopy , Microcontroller Based Flame Photometer 3.Molecular biology and immunoassay techniques - Flow cytometry, PCR, Eliza plater reader, Electrophoresis
Experiential learning Activity		
Experiential learning No	**Name**	**Activity details**

Experiential-Learning 2.1	Familiarise with the principles and applications of the instruments and Equipment (Instruments no. 1 to 12 mentioned under Practical Training 2.1)	The scholars should perform the operating procedures of all the instruments demonstrated during practicals Assign the scholars with Sample protocols for interpreting results through research papers to understand Analysis and Interpretation of results The scholars will engage in Group Discussion on the basics of Analytical chemistry pertaining to the interpretation of Instruments
Experiential-Learning 2.2	Familiarise with the principles and applications of the instruments and Equipment (Instruments no.13 to 24 mentioned under Practical Training 2.1 and 2.2)	The scholars should perform the operating procedures of all the instruments demonstrated during practicals Assign the scholars with Sample protocols for interpreting results through research papers to understand Analysis and Interpretation of results The scholars will engage in Group Discussion on the basics of Analytical chemistry pertaining to the interpretation of Instruments
Experiential-Learning 2.3	Familiarise with the principles and applications of the instruments and Equipment (Instruments no. 25 to 36 mentioned under Practical Training 2.2)	The scholars should perform the operating procedures of all the instruments demonstrated during practicals Assign the scholars with Sample protocols for interpreting results through research papers to understand Analysis and Interpretation of results The scholars will engage in Group Discussion on the basics of Analytical chemistry pertaining to the interpretation of Instruments
Experiential-Learning 2.4	Familiarise with principles and applications of the instruments and Equipment employed	The scholars should acquaint and perform or explain the operating procedures of all the instruments demonstrated during practicals of Chromatographic and Spectrophotometric methods mentioned in Practical Training 2.3 Assign the scholars with Sample protocols for interpreting results through research papers to understand Analysis and Interpretation of results The scholars will engage in Group Discussion on the basics of Analytical chemistry and theories of physics pertaining to the use

	for Chromatographic and Spectrophotometric methods.	and interpretation of Instruments with Advantages, limitations and newer developments in the field of Analytical Chemistry
Experiential-Learning 2.5	Familiarise with principles and applications of the instruments and Equipment used in molecular biology and immunoassay techniques.	The scholars should acquaint and perform or explain the operating procedures of all the instruments used in molecular biology and immunoassay techniques demonstrated during practicals of those mentioned in Practical Training 2.3

Modular Assessment

Assessment method	**Hour**
Instructions- Conduct a structured Modular assessment. Assessment will be for 75 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. • Checklist Based Assessment – Student will be assigned instrument/equipment and assessment will be based on a checklist to understand the ability to comprehend the principles , ability to follow SOPs, demonstration and adherence to the common components of operating procedure with utility of the same -25 Marks • Project-Based Assessment: Group task where the students are supposed to review published papers on Analytical studies and summarize the Instruments/Equipment used, rationality in choosing them , methodology , interpretation of the data with advantages and challenges in Drug Research of Ayurved .-25 Marks • Problem based Assessment – Problem based scenarios pertaining to instruments are presented to students where the students are gauged on their ability to analyse the causes- 25 Marks Or Any two practicals in converted form can be taken for assessment. 25*2 =50 Marks and Any of the experiential as portfolio/ reflections / presentations can be taken as assessment.25 Marks	6

Module 3 : Introduction to Experimental Pharmacology

Module Learning Objectives
(At the end of the module, the students should be able to)

1. Describe the applications of various commonly used laboratory animals.
2. Appreciate and demonstrate the various screening methods used in preclinical research.
3. Design and execute a research hypothesis independently.

Unit 1 Laboratory Animals

Commonly used laboratory animals and screening methods

References: 29,30,31,32,33,34

3A	3B	3C	3D	3E	3F	3G
CO 1	Describe commonly used experimental animals (Albino mouse, albino rat, guinea pig, hamster, rabbit).	1	Lecture	CC	Knows-how	L&GD,L_VC
CO 1	Describe the composition and role of the research ethics committee (Animal welfare, The Committee for Control and Supervision of Experiments on Animals (CCSEA), Institutional Animal. Ethics Committee (IAEC) & Institute Biosafety Committee (IBC).	2	Lecture	CC	Knows-how	L&GD,L_VC
CO 1	Describe maintenance of laboratory animals as per cpcsea guidelines, animal care, handling, diet, sex determination & identification mark, dose calculations & route of drug administrations, blood collections, anesthesia & Euthanasia	2	Lecture	CC	Knows-how	L&GD,L_VC
CO 1	Demonstrate different research animal experiments concepts in Ayurveda medicine	2	Practical	PSY-	Shows-	DIS,PBL

	systems with examples.		Training 3.1	GUD	how	
CO 1	Demonstrate proper techniques for administering drugs via various routes (feeding or oral gavage, injection site & technique - intraperitoneal, intravenous, intramuscular, subcutaneous, intracardiac) in experimental animals.	4	Practical Training 3.2	PSY-GUD	Knows-how	CBL,DIS
CO 1	Demonstrate the proper technique for collecting blood samples from the retro-orbital sinus, the proper technique for dissecting and collecting organs, the proper techniques for sacrificing and Understand the principles of histopathology.	4	Practical Training 3.3	PSY-GUD	Shows-how	L_VC
CO 1	Demonstrate proper animal handling techniques, describe common routes of drug administration and demonstrate proper blood collection techniques.	5	Experiential-Learning 3.1	AFT-VAL	Shows-how	FV,L&GD,L_VC, SDL
CO 1	Identify the proper technique for retro-orbital bleeding, for dissection and organ collection, for sacrificing animals and understand the principles of histopathology.	8	Experiential-Learning 3.2	AFT-VAL	Shows-how	FV,SDL

Unit 2 Preclinical screening models & Computer aided learning

Preclinical screening models & Computer aided learning

References: 31,35,36,37

3A	3B	3C	3D	3E	3F	3G
CO 1	Describe various drug screening methods used to assess behavioral, CNS, analgesic, anti-inflammatory, antipyretic, and muscular strength parameters in animal experimental models.	5	Lecture	CAN	Knows-how	L&PPT
CO 1	Demonstrate drug screening methods of Gross behaviour, CNC activity.	5	Practical Training 3.4	PSY-GUD	Shows-how	FV,L_VC
CO 1	Demonstrate drug screening methods of analgesic, antiinflammatory, antipyretic activity & measuring the strength of mice.	5	Practical Training 3.5	PSY-GUD	Shows-how	FV,L_VC

CO 1	Demonstrate the observation of gross behavior, assessment of CNS activity.	5	Experiential-Learning 3.3	PSY-GUD	Shows-how	FV,SDL
CO 1	Demonstrate the drug screening methods of analgesic, anti-inflammatory, antipyretic effects & muscular strength in laboratory animals.	8	Experiential-Learning 3.4	PSY-GUD	Shows-how	FV,SDL

Practical Training Activity

Practical No	**Name**	**Activity details**
Practical Training 3.1	Demonstrate the procedures of albino mouse, albino rat, guinea pig, hamster & rabbit handling technique.	The teacher will demonstrate either in the lab or with the help of a video.
Practical Training 3.2	Demonstrate procedures of routes of drug administration's in experimental animals (feeding or oral gavage, injection site & technique-intraperitoneal, intravenous, intramuscular, subcutaneous, intracardiac and blood collection)	The teacher will demonstrate procedures of routes of drug administration's in experimental animals (feeding or oral gavage, injection site & technique-intraperitoneal, intravenous, intramuscular, subcutaneous, intracardiac and blood collection) either in the lab or with the help of a video.
Practical Training 3.3	Demonstrate procedures of retro-orbital bleeding, dissection and organ	The teacher will demonstrate either in the lab or with the help of a video on on retro-orbital bleeding, dissection and organ collection, methods of Sacrifice and basics of Histopathology (preservation, transportation and microtome sectioning).

	collection, methods of Sacrifice and basics of Histopathology (preservation, transportation and microtome sectioning).	
Practical Training 3.4	Demonstrate drug screening methods of Gross behaviour, CNC activity.	The teacher will demonstrate either in the lab or with the help of a video of screening methods of Gross behaviour, CNC activity. The teacher will facilitate a group discussion on above studies and explore the limitations/ challenges/ possibilities of studies in Ayurveda medicine.
Practical Training 3.5	Demonstrate drug screening methods of analgesic, antiinflammatory, antipyretic activity & measuring the strength of mice.	The teacher will demonstrate either in the lab or with the help of a video of screening methods of analgesic, antiinflammatory, antipyretic activity & measuring the strength of mice. The teacher will facilitate a group discussion on above studies and explore the limitations/ challenges/ possibilities of studies in Ayurveda medicine.
Experiential learning Activity		
Experiential learning No	**Name**	**Activity details**
Experiential-Learning 3.1	Identifying the proper techniques of animal handling technique, routes of drug administrations and blood collection.	Demonstrate proper animal handling techniques, different routes of drug administration & different blood collection methods under supervision. Discuss the importance of proper animal handling techniques, and the advantages and disadvantages of each route of administration & each blood collection method.
Experiential-Learning 3.2	Acquire the knowledge of conducting of retro-	Demonstrate the procedure of retro-orbital bleeding, the procedure of dissection and organ collection, different methods of sacrifice & the basics of histopathology and note down the observations of practical during visit to animal house.

	orbital bleeding, dissection and organ collection, methods of sacrifice and basics of histopathology.	Discuss the importance of retro-orbital bleeding, potential risks, and alternatives; proper dissection and organ collection techniques; sacrifice methods, potential risks, and alternatives & histopathology in research and diagnostics.
Experiential-Learning 3.3	Acquire the knowledge of conducting drug screening methods of Gross behaviour, CNC activity.	Demonstrate how to observe and record gross behavior in laboratory animals & to assess CNS activity in laboratory animals. Discuss the importance of gross behavior observation & CNS activity assessment in drug screening with help of research articles.
Experiential-Learning 3.4	Acquire the knowledge of conducting of analgesic, anti-inflammatory, antipyretic activity & measuring the strength of mice.	Demonstrate how to screen for analgesic activity, anti-inflammatory activity, antipyretic activity & how to measuring the strength of mice. Discuss the principles of analgesic activity screening, anti-inflammatory activity, antipyretic activity, measuring the strength of mice and the importance of this assay in drug development and research, through journal club.

Modular Assessment

Assessment method	**Hour**
Instructions - Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. • SAQ: 5 questions (2 questions from first unit & 3 questions from second unit) – 25 Marks • Animal Laboratory report evaluation: 25 marks Evaluation of summary reports of Animal house visits, experiments in the lab, or demonstrated instruments: The report will be evaluated on the basis of active participation during the visit/lab, observation book detailing the observations during the visit/lab, and record-keeping. or Any practical in converted form can be taken for assessment. (25 Marks) and	4

Any of the experiential as portfolio/ presentations, can be taken as assessment. (25 Marks)	

Module 4 : Guna and their pharmacotherapeutics

Module Learning Objectives
(At the end of the module, the students should be able to)

1. Analyze the Pharmacotherapeutics of Guna.
2. Interpret the applications of Gunas.
3. Attain the updated knowledge of researches in relation to Gunas.

Unit 1 Gurvadi Guna

20 Gurvadi Guna

References: 38,39,40,41,42,43,44,45

3A	3B	3C	3D	3E	3F	3G
CO 1	Interpret Gurvadi Guna and analyze the Physiological effects of these gunas.	2	Lecture	CAN	Knows-how	BS,CBL,DIS
CO 1	Discuss the Biophysical and Biochemical Approach to understand the concept of Gurvadi Guna through evidence based research and analyse the pharmacodynamics based on quality attributes.	2	Lecture	CAN	Knows-how	BS,DIS
CO 1	Analyze the applied aspects of Guna in clinical practice with case studies.	1	Lecture	CAP	Knows-how	BS,CBL,DIS,FC
CO 1	Perform the assessment of Guna by physicochemical tests.	8	Practical Training 4.1	PSY-GUD	Shows-how	DL,KL,ML,PAL,PrBL

CO 1	Apply the principles of Guna in clinical practice.	2	Practical Training 4.2	CAP	Does	CBL,DIS, IBL,PAL, PBL,RLE
CO 1	Perform and practice the assessment of Guna by physicochemical tests.	10	Experiential-Learning 4.1	PSY-GUD	Does	KL,PAL, RLE,SDL ,TPW
CO 1	Practice the application of Guna in day to day clinical practice.	6	Experiential-Learning 4.2	AFT-RES	Does	CBL,PAL ,PSM,RL E,SDL

Unit 2 Paradii Guna

10 Paradii Guna

References: 38,39,40,41,42,43,44,45

3A	3B	3C	3D	3E	3F	3G
CO 1	Discuss the interpretation and relevance of Paradi Guna. Para-Apara-Yukti Sankhya, Samyoga, Vibhaga Prithaktva, Parimana, Samskara and Abhyasa.	3	Lecture	CAP	Knows-how	BS,CBL, DIS,FC,J C
CO 1	Appraise the role of Paradi Guna in successful implementation of treatment.	2	Lecture	CAP	Knows-how	CBL,DIS, PER,PBL
CO 1	Demonstrate the application of Paradi Guna in compounding of drugs, in clinical practices and research.	10	Practical Training 4.3	PSY-GUD	Shows-how	BS,CBL, D,JC,ML, PAL
CO 1	Perform and practice the application of Paradi Guna in compounding of drugs, in clinical	10	Experiential-	AFT-RES	Does	CBL,JC,L

	practices and research.		Learning 4.3			S,PAL,PER,RLE,RP

Unit 3 Vishishta Guna & Adhyatma Guna

5 Vishishta Guna & 6 Adhyatma Guna

References: 38,39,40,41,42,43,44,45

3A	3B	3C	3D	3E	3F	3G
CO 1	Analyze the utility of Vishishta gunas in collection, selection and quality determination of Dravya.	3	Lecture	CAN	Knows-how	BS,DG,DL,DIS,IBL,KL
CO 1	Demonstrate the significance of Vishishta guna in macroscopic evaluation of crude drugs.	6	Practical Training 4.4	PSY-GUD	Shows-how	DL,PT,TBL
CO 1	Apply Vishishta gunas in Dravya Pareeksha.	9	Experiential-Learning 4.4	PSY-SET	Does	DA,FV,KL,LS,ML,PAL
CO 1	Discuss the therapeutic implications of Adhyatmika Gunas.	2	Lecture	CAP	Knows-how	BS,CBL,L&GD
CO 1	Analyze case papers to understand the role of Adhyatma Guna in Psychiatric practice.	4	Practical Training 4.5	AFT-SET	Shows-how	CBL,DIS,ECE,IBL,JC,PBL
CO 1	Apply Adhyatma Guna in Psychiatric practice and demonstrate skills in applying Adhyatma guna concepts to patient care.	4	Experiential-Learning 4.5	AFT-RES	Does	CBL,DIS,IBL,ML,PAL,PBL,S

						DL

Practical Training Activity		
Practical No	**Name**	**Activity details**
Practical Training 4.1	Perform the assessment of Guna by physicochemical tests- 3 drugs for each guna- Guru-Laghu, Snigdha-Ruksha.	Application of physico-chemical tests to assess the selected gunas with 2 drugs for each guna- Guru-Laghu, Snigdha-Ruksha. Guru and Laghu guna by Bulk density, Tap density and Specific gravity. Snigdha and Ruksha Guna by Loss on Drying (Moisture content), Fat content, Water absorption Index (WAI), Oil Absorption Index (OAI) and Swelling index. Detailed methodology and interpretation are given in the annexure 1. Proteolytic hydrolysis of milk to assess Guru-laghu guna Biochemical experiment to assess Gurutva in different part of the plant- patra, Pushpa, Phala, Naala, Kanda
Practical Training 4.2	Application of the principles of Guna in clinical practice.	Describe the case scenario or study case sheets or examine the cases in IPD/OPD. Understand Guna predominance in different diseases. Discuss the selection of drug based on Gurvadi guna.
Practical Training 4.3	Demonstrate the application of Paradi Guna in compounding of drugs and in clinical practices and research.	Observe in pharmacy, different aspects related to compounding of drugs/ formulations like selection of quality raw drugs, separation of adulterants, mixing, processing etc., Demonstrate the application of Sankhya, Samyoga, Vibhaga, Parimana and Samskara etc., in different pharmaceutical processes. Observe the clinical practices in terms of selection of drugs and planning the treatment (drug of choice, dosing etc) and discuss the application of Paradi gunas in these practices. Perform selection of research designs / design experimental models w.r.t pre-clinical and clinical studies. Analyze the application of Paradi gunas in these areas.
Practical Training 4.4	Demonstrate the significance of Vishishta guna in macroscopic evaluation of crude drugs	Teacher should allott drugs to students as per specific vishishta gunas (One drug for each useful part- stem, root, leaf, flower, fruit, seed, gum-resin) Student should perform organoleptic evaluation of drugs under the guidance of the teacher. Students should analyze the importance of Vishishta guna in organoleptic evaluation of crude drugs.
Practical	Analyze case papers to	Case scenario-based discussions should be conducted to interpret the application of Adhyatma Guna (in nidana and chikitsa) in

Training 4.5	understand the role of Adhyatma Guna in Psychiatric practice.	Psychiatric practice. Class presentations. Symposiums and seminars.
Experiential learning Activity		
Experiential learning No	**Name**	**Activity details**
Experiential-Learning 4.1	Performing and Practicing the assessment of Guna by physicochemical tests- 3 drugs for each guna- Guru-Laghu, Snigdha-Ruksha.	Application of physico-chemical tests to assess the selected gunas with 3 drugs for each guna- Guru-Laghu, Snigdha-Ruksha. Guru and Laghu guna by Bulk density, Tap density and Specific gravity. Snigdha and Ruksha Guna by Loss on Drying (Moisture content), Fat content, Water absorption Index (WAI), Oil Absorption Index (OAI) and Swelling index. Practice other methods like- phytochemical analysis, proteolytic hydrolysis and biochemical experimental models taught during practicals. Explore evidence-based research in this area. Apply the methods like mobile learning, journal club, group discussions, presentations and peer assisted learning.
Experiential-Learning 4.2	Practicing the application of Guna in day-to-day clinical practice.	1. Students can be posted to IPD/OPD where they can study the case papers, analyze the case history and understand the specific guna predominance in the disease. 2. Describe and present the case scenario. 3. Discuss the selection of drugs based on Gurvadi guna. 4. Clinical cases related to different systems (or Srotas) can be included and amshamsha kalpana of gunas in the presentation of the disease can be analyzed. 5. Samprapti vighatana based on guna can be presented by the students.
Experiential-Learning 4.3	Practicing the application of Paradi Guna in compounding of drugs, in clinical practices and research.	Observe in pharmacy, different aspects related to compounding of drugs/ formulations like selection of quality raw drugs, separation of adulterants, mixing, processing etc., Demonstrate the application of Sankhya, Samyoga, Vibhaga, Parimana and Samskara etc., in different pharmaceutical processes. Observe the clinical practices in terms of selection of drugs and planning the treatment (drug of choice, dosing etc) and discuss the application of Paradi gunas in these practices. Perform selection of research designs / design experimental models w.r.t pre-clinical and clinical studies. Analyze the application of Paradi gunas in these areas. Organize discussion clubs and symposiums.

Experiential-Learning 4.4	Application of Vishishta guna in Dravya Pareeksha- macroscopic evaluation of crude drugs	Students should procure drugs as per specific vishishta gunas (One drug for each useful part- stem, root, leaf, flower, fruit, seed, gum-resin) and perform organoleptic evaluation of drugs. Record the observations and compare different samples of different useful parts. Repeat and gain insights.
Experiential-Learning 4.5	Applying Adhyatma guna concepts to patient care.	Case taking and assessment of Psychiatric/ Psychosomatic disorder. Analyze adhyatma guna involved in manifestation of the condition. Application of Buddhi and Prayatna for psychological support and counselling.

Modular Assessment

Assessment method	**Hour**
Instructions- Conduct a structured Modular assessment. Assessment will be for 75 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. • Case scenario-based assessment. Each student will be explained a case scenario and the student has to analyse the predominance of Guna in the disease and choose the suitable drugs with appropriate reasoning- 20 Marks • Assessment of Guna based on Physicochemical tests- 20 Marks • Organoleptic analysis of crude drugs, one drug from each useful part– 35 Marks Or Any practical in converted form can be taken for assessment- 35 Marks And Any of the experiential as portfolio/ reflections / presentations can be taken as assessment- 40 Marks	6

Module 5 : Rasa and their pharmacotherapeutics

Module Learning Objectives
(At the end of the module, the students should be able to)

1. Analyze the Pharmacotherapeutics of Shad Rasa.
2. Evaluate rasa based on subjective assessment methods.
3. Interpret recent research findings on Shadrasa

Unit 1 Shadrasa

Shadrasa

References: 38,39,40,41,42,43,44,45,46,47,48,49,50,51,52,53

3A	3B	3C	3D	3E	3F	3G
CO 1	Analyze Shad Rasa in detail. Discuss the impact of Shad rasa in etiology and management of various pathologies.	8	Lecture	CAN	Knows-how	DIS,L&GD,PAL
CO 1	Interpret the pathway of taste perception. Analyze the concept of extra oral taste receptors and their clinical relevance.	1	Lecture	CAN	Knows-how	BS,L&PPT
CO 1	Analyze the role of Shad rasa in relation to phytoconstituents.	1	Lecture	CAN	Knows-how	BS,IBL,JC,L&PPT,LS,ML,PAL
CO 1	Perform the assessment of rasa- Madhura, Amla and Lavana - 3 drugs for each rasa by taste threshold method.	9	Practical Training 5.1	PSY-GUD	Shows-how	DL,KL,PL

CO 1	Perform the assessment of rasa by taste threshold method- Katu, Tikta and Kashaya- 3 drugs for each rasa.	9	Practical Training 5.2	PSY-GUD	Shows-how	D,KL,PAL
CO 1	Explore and interpret different mechanisms of Advanced taste sensors like artificial- lipid membranes and e-tongue through videos and discussion on research papers.	2	Practical Training 5.3	CAN	Knows-how	IBL,JC,ML,PAL,TBL
CO 1	Perform the assessment of rasa by different methods.	10	Experiential-Learning 5.1	PSY-MEC	Does	KL,PAL,PT,PrBL,RLE,SDL
CO 1	Design and present a case scenario for promotion of Shadrasa concept in public health.	10	Experiential-Learning 5.2	PSY-SET	Does	CBL,IBL,PAL,PrBL,RLE,TPW
CO 1	Execute the assessment of rasa by taste threshold method in different prakruti people.	3	Experiential-Learning 5.3	PSY-SET	Does	KL,PAL,PBL,RLE,SDL,TPW,TBL
CO 1	Explore and interpret the Phytochemistry of dravyas based on specific rasas.	3	Experiential-Learning 5.4	PSY-SET	Does	BS,JC,LS,Mnt,ML,PAL,SDL

Practical Training Activity

Practical No	Name	Activity details
Practical Training 5.1	Perform the assessment of rasa by taste threshold method. Assess 3 drugs each for Madhura, Amla,	The selected herb powder (for each rasa) is sieved through mesh size #80 5 grams of dried powder of the samples is taken in 100 ml of water and stir well for 30 minutes; then filter with the filter paper. The filtrate is used as a stock solution for further dilutions. Volunteers should rinse the mouth with distilled water. 1 ml of filtered solution is taken and tasted.

	Lavana, Katu, Tikta and Kashaya rasas.	Dilutions are prepared by mixing 1 ml of stock solution with distilled water in the ratio of 1:10, 1:20, 1:30, 1:40 etc. Intermediate dilutions can be prepared. The point at which the taste was last perceived is considered as the taste threshold of that taste in that drug. Record taste intensity (mild, moderate, strong). Detailed methodology is given in the annexure 2.
Practical Training 5.2	Perform the assessment of rasa by Qualitative and quantitative methods using earthworms	Performing the assessment of rasa by Qualitative method using earthworms- observing and recording the behaviour of earthworms on exposure to specific rasa dravyas. Performing the assessment of rasa by quantitative methods using earthworms- observing and recording the movement of earthworms on providing electric shock after exposure to specific rasas.
Practical Training 5.3	Explore different mechanisms of Advanced taste sensors like artificial- lipid membranes and e-tongue.	Search research papers on Advanced taste sensors using artificial- lipid membranes Search research papers on application of e-tongue. Refer videos on application of e-tongue. Critical appraisal of application through discussions.

Experiential learning Activity

Experiential learning No	**Name**	**Activity details**
Experiential-Learning 5.1	Exploring the assessment of rasa by different methods.	Students have to work in groups and assess the rasa of different drugs by applying different methods like: 1. Taste threshold- cold method 2. Taste threshold- hot method 3. Taste threshold- dilution method 4. Based on phytoconstituents 5. Based on Rasa lakshana 6. Direct perception with Churna of natural raw material

		The detailed methodologies are given in the annexure 2. The results from different methods can be compared.
Experiential-Learning 5.2	Designing/ describing a case scenario for promotion of Shadrasa concept in public health.	Writing concept note on role of rasa in improving public health/ nutrition. Role of excessive intake of particular rasa in causing health issues in day-to-day life. Public awareness on use of Rasa for maintenance of health. Students might visit different schools, colleges and offices and educate regarding the role and significance of Rasa in public health. Students can also make short videos on the importance of Rasa in Ahara, seasonal intake of different rasas and share them.
Experiential-Learning 5.3	Execution of the assessment of Rasa by Taste threshold method in different prakruti people and grading of Rasa	The students can be grouped based on their Prakruti and taste threshold assessment can be done to see how taste is perceived by different Prakruti people by applying Taste threshold- cold method. Grading of rasa can be done- like Uttama, Madhyama, Avara. Once threshold of Rasa is attained, Anurasa perception can be carried out
Experiential-Learning 5.4	Exploring the Phytochemistry of dravyas based on specific rasas.	Exploring the Phytochemistry of dravyas based on specific rasas by using databases and comparing them

Modular Assessment

Assessment method	**Hour**
Instructions- Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. • Case scenario-based assessment – 10 marks. Each student will be explained a case scenario and the student has to analyse the role of specific rasa as causative factor for manifestation of disease and role of rasa in treatment. 10 Marks • Assessment of Rasa based on Rasa lakshana and Phytoconstituents- 20 Marks • SAQ- 4 questions- 20 marks Or Any practical in converted form can be taken for assessment- 25 marks.	4

and Any of the experiential as portfolio/ reflections / presentations can be taken as assessment- 25 marks.	

Module 6 : Vipaka and their pharmacotherapeutics

Module Learning Objectives
(At the end of the module, the students should be able to)

1. Analyze the Pharmacotherapeutics of Vipaka.
2. Interpret the applications of Vipaka.
3. Interpret recent research findings on Vipaka.

Unit 1 Vipaka

Vipaka

References: 38,39,40,41,42,43,44,45,54,55

3A	3B	3C	3D	3E	3F	3G
CO 1	Analyze the concept of Vipaka in detail.	2	Lecture	CAN	Knows-how	BL,DIS,L &PPT ,LS
CO 1	Interpret the role of Vipaka in clinical practice and its application in various health conditions.	1	Lecture	CAP	Knows-how	CBL,FC
CO 1	Discuss the concept of Vipaka in relation to metabolism, gut microbiota, and related physiological aspects with documented evidences.	1	Lecture	CC	Knows-how	BS,ML,PAL
CO 1	Discuss experimental and clinical models used for the assessment of Vipaka through analysis of published literature.	2	Lecture	CC	Knows-how	JC,LS,ML ,PAL,PER ,TBL
CO 1	Perform and interpret Vipaka principles by in-vitro experimentation.	10	Practical	PSY-	Shows-	D,DIS,KL

			Training 6.1	GUD	how	,PAL,PrBL,TPW
CO 1	Perform and interpret Vipaka principles by in-vivo experimentation.	10	Practical Training 6.2	PSY-GUD	Shows-how	D,IBL,KL,PAL,PT,PrBL,TPW
CO 1	Assess Vipaka of selected drugs by the application of Invitro digestion technique.	10	Practical Training 6.3	PSY-GUD	Shows-how	DL,KL,PAL
CO 1	Assess Vipaka of selected drugs by Hydrolysis method	10	Experiential-Learning 6.1	PSY-GUD	Does	KL,PAL,PT,RLE,SDL,TPW,TBL
CO 1	Assess Vipaka of selected drugs by real life experience	10	Experiential-Learning 6.2	PSY-SET	Does	KL,PL,RLE,SDL

Practical Training Activity

Practical No	Name	Activity details
Practical Training 6.1	Performing and interpretation of Vipaka principles by in-vitro experimentation.	Grounded *Haridra, Sunthi* and *Aardrak* are digested with simulated gastric juice. They are neutralised and extracted with diethyl ether. The extracts, after complete evaporation of the solvent are tasted by blinded subjects in comparison with control (undigested raw material).
Practical Training 6.2	Performing and interpretation of Vipaka principles by in-vivo experimentation.	Assessment of Vipaka in animal models using Metabolic cage to determine the action of Vipaka on Mala and Shukradhatu. The experimental animals (albino rats) should be grouped into two groups, each group with 10 animals. Trial group will receive the specific Vipaka Dravya (Madhura, Amla or Katu Vipaka) selected as per the classics. The other group is kept as control. The study should be conducted in metabolic cages by segregating the animals in individual cages. The quantity of urine and faeces shall be measured every day for 10 days. The effects of the administered Dravya on mala is then related to classical information to related with Vipaka (Srishta or baddha vinmutra). Then the mating behaviour is also documented. The animal is sacrificed to study the testicular histology to relate with Vipaka of Dravya (Shukrala or Shukraghna).

Practical Training 6.3	Assessment of Vipaka of selected drugs by the application of Invitro digestion technique.	As Vipaka refers to post digestive effect, Madhura, Amla and Katu Vipaka can be assessed by applying invitro digestion model by using simulated digestion fluids and enzymes on selected drugs for each type of Vipaka. Pre and post digestion, the following assessments can be done. Relative understanding of specific Vipaka through following methods: 1. Madhura Vipaka- Quantitative estimation of Carbohydrates, Proteins before and after invitro digestion 2. Amla Vipaka- Quantitative estimation of pH before and after invitro digestion 3. Katu Vipaka- Quantitative estimation of Alkaloids, Phenols before and after invitro digestion Detailed methodology is given in the annexure 3. (Further new methods can be developed as per the understanding of the faculty).

Experiential learning Activity		
Experiential learning No	**Name**	**Activity details**
Experiential-Learning 6.1	Assessment of Vipaka of selected drugs by Hydrolysis method	The selected drugs should be boiled with 3 N HCl for half an hour. This causes conversion of starch into Glucose. The total carbohydrates are then determined by Anthrone method to see the extent of conversion.
Experiential-Learning 6.2	Assessment of Vipaka of selected drugs by real life experience	Select dravyas for Madhura vipaka- 2 drugs (1 each with Madhura & Lavana rasa), Amla- 1 drug (Amla rasa), Katu Vipaka - 3 drugs (1 each with Katu, Tikta, Kashaya rasas). The students can themselves be volunteers and consume the Dravya in fixed dose for a fixed duration (say for 7 days). Diet can be kept constant. Then the effect of drug on Dosha, dhatu and mala should be observed and recorded.

Modular Assessment	
Assessment method	**Hour**
Instructions- Conduct a structured Modular assessment. Assessment will be for 50 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. • Conduct debate on the “Whether or not Vipaka can be understood on the basis of metabolism and gut microbiota”- 30 Marks. • Assignment on various experimental models for tha assessment of Vipaka – 20 Marks.	4

Or Any practical in converted form can be taken for assessment- 25 marks. and Any of the experiential as portfolio/ reflections / presentations can be taken as assessment- 25 marks.	

Module 7 : Virya and Prabhava and their pharmacotherapeutics

Module Learning Objectives
(At the end of the module, the students should be able to)

1. Analyze the Pharmacotherapeutics of Virya and Prabhava.
2. Interpret the applications of Virya and Prabhava.
3. Interpret recent research findings on Virya and Prabhava.

Unit 1 Veerya

Veerya

References: 38,39,40,41,42,43,44,45,56,57,58,59

3A	3B	3C	3D	3E	3F	3G
CO 1	Analyze the role of Sheeta and Ushna Virya in understanding drug action and discuss their clinical application in various health conditions.	2	Lecture	CAP	Knows-how	FC,L&GD,PER
CO 1	Analyze the Virya concept on the basis of active constituents, bioavailability and efficacy.	1	Lecture	CAN	Knows-how	BS,IBL,JC,L&GD,L&PPT
CO 1	Demonstrate the assessment of Virya by membrane transmission model, In-silico model and Endothermic/exothermic reaction.	6	Practical Training 7.1	PSY-GUD	Shows-how	D,DIS,IBL,KL,ML,PAL,TPW,TBL
CO 1	Explore and interpret different experimental models for the assessment of Ushna and Sheeta Virya based on virya action.	7	Experiential-Learning 7.1	PSY-GUD	Does	IBL,JC,Mnt,ML,PA

						L,SDL,TPW

Unit 2 Prabhava

Prabhava

References: 38,39,40,41,42,43,44,45

3A	3B	3C	3D	3E	3F	3G
CO 1	Interpret the concept of Prabhav in Ayurveda and modern scientific context.	1	Lecture	CC	Knows-how	L&GD,L&PPT ,PL
CO 1	Interpret the clinical applications of Prabhava.	1	Lecture	CAP	Knows-how	DIS,IBL,L&GD
CO 1	Perform Network Pharmacology analysis on selected drugs acting by Prabhava in specific diseases.	4	Practical Training 7.2	PSY-GUD	Does	D,KL,Mnt,PAL
CO 1	Analyze the differences between Prabhava (Specific pharmacological effect) and Samanya karma (general pharmacological effects).	2	Experiential-Learning 7.2	CAN	Knows-how	IBL,JC,LS,PL
CO 1	Select the Vichitra Pratyayarabdha and Prabhava dravyas from classical texts and enlist the Vichitra Pratyayarabdha and Prabhava dravyas (five for each) and Conduct Network Pharmacology analysis on selected drugs acting by Prabhava in specific diseases.	4	Experiential-Learning 7.3	PSY-SET	Does	KL,LS,Mnt,ML,PAL,RLE

Practical Training Activity

Practical No	Name	Activity details
Practical Training 7.1	Demonstrate the assessment of Virya by Membrane transmission	Membrane Transmission assay by Franz diffusion Cell apparatus 1. This is an in-vitro diffusive model to screen the penetration ability of active ingredients in various formulations. 2. The experiment involves biological membrane (mucosa or skin) or a non-animal based synthetic membrane build up by multiple

	model, In-silico model and Endothermic/exothermic reaction.	layers of polyether sulfones coated with skin lipids, which mimics the penetration ability of human skin. 3. The experiment utilizes Franz Diffusion Cell (FDC) system which consists of a receiver compartment filled with 5 mL Phosphate Buffered Saline (PBS), in which the compound is released after penetrating through the skin surrogate. 4. The sample is applied into the donor compartment and penetration kinetics over time is evaluated. 5. After an experimental equilibration for 30 min, different exposure times (1, 2, 4, 6, 8 hours) are adopted and 1000 micro litre (or 20%) of the receiver compartment is collected. The solution is then HPLC analyzed (with a standard marker). Detailed methodology is given in the annexure 4. Molecular Docking and Identifying Sheeta/Ushna Properties (In support of Karma Virya Vada) Molecular docking is a computational method used to predict the binding interaction between a ligand (molecule, such as a phytochemical) and a target protein (receptor, enzyme, etc.). This method allows researchers to investigate how bioactive compounds from medicinal plants might exert "cold" (Sheeta) or "hot" (Ushna) effects at the molecular level by interacting with specific biological targets involved in metabolic or inflammatory pathways. Detailed methodology is given in the annexure 5. Exothermic and Endothermic reaction 1. Select the Ushna and Sheeta virya dravyas as mentioned in the classics. 2. 10 ml of distilled water is taken separately in 3 identical glass beakers and temperature is noted down for three times in each beaker. 3. 15 grams of selected Ushna virya Dravya (fine powder, sieved through #80 mesh) is added to all the three beakers and change in temperature is noted after 2 minute, 4 minutes and 6 minutes using a handheld digital thermometer. 4. The procedure is repeated with a selected Sheeta virya Dravya. The results are tabulated. Rise or fall of temperature is noted and compared. Detailed methodology is given in the annexure 6.
Practical Training 7.2	Perform Network Pharmacology analysis on selected drugs acting by Prabhava in specific diseases.	Identify specific drugs which act by Prabhava as per the classics. Conduct Network Pharmacology analysis by following steps: (Annexure 7) 1. Conduct the Identification (Data mining) of active constituents by Pubmed, IMPPAT, Dr.Duke’s and PubChem in digital library 2. Conduct drug Target identification for by Binding DB. 3. Disease target to be downloaded from Gene cards database. 4. Use Venny database to find common targets and get Venn diagram. 5. Copy common targets. Conduct GO (Gene ontology) enhancement analysis, use STRING database to get pathway enrichment data. 6. Use KEGG, select the pathway to obtain the diagram.

		7. Conduct Network construction by Cytoscape.
Experiential learning Activity		
Experiential learning No	**Name**	**Activity details**
Experiential-Learning 7.1	Exploring different experimental models for assessment of Ushna and Sheeta Virya based on virya action	Compile the classical actions of Ushna and Sheeta Virya. Explore experimental methods (invitro and invivo) for possible assessment of Virya based on these actions. Design and present the experiments and perform with available models (invitro or invivo). 1. Eg. Biochemical experiment- Pseudo acetylcholine esterase inhibition (IU) by *Agneya/ Ushna Dravya- Maricha, Chitraka, Rajika.* 2. Animal Experiment- (*Agneya Dravya* and *Dhatu Samvardhan)*- Increase in Haemoglobin after administration of Ushna dravya 3. Videos of molecules, active constituents. . Journal club- learning newer concepts and recent developments in the understanding of Virya.
Experiential-Learning 7.2	Analyzing the differences between Prabhava (Specific pharmacological effect) and Samanya karma (general pharmacological effects) based on different criteria.	Take examples of drugs having identical rasadi (similar properties) but showing specific action. (Eg.Danti and Chitraka). Analyze the cause for the specific action based on different criteria (phytoconstituents, physical property, chemical nature etc.,)
Experiential-Learning 7.3	Exploring the vichitra pratyayarabdha and Prabhava dravyas from classical texts, enlisting them and practicing network Pharmacology steps for selected drug acting by Prabhava in	Explore the different classical texts and enlist the vichitra pratyayarabdha and Prabhava dravyas (five for each). Practice the steps of Network Pharmacology analysis on one selected drug acting by Prabhava in specific disease. Presentations and small projects can be planned to analyze the mode of action.

	specific diseases.	

Modular Assessment

Assessment method	Hour
Instructions- Conduct a structured Modular assessment. Assessment will be for 25 marks. Keep structured marking pattern. Use different assessment methods in each module for the semester. Keep record of the structured pattern used for assessment. Calculate the Modular grade point as per table 6 C. Portfolio/ reflections / presentations - Presentation of an experimental model for assessment of Ushna and Sheeta Virya based on virya action. (15 Marks) (Can be given as an assignment). Checklist as follows: 1.Submit a draft of your proposed experimental model. 2.Receive feedback from your mentor/ guide on methodology. 3.Revise the report based on the feedback. 4.Present the model including reflections on what you learned during experiential learning. 5. Show drafts of experiential learning with notes on what was challenging and how you overcame the obstacles. And Demonstrate Network Pharmacology steps with a given drug. (10 Marks) Or Any practical in converted form can be taken for assessment- 25 marks Or Any experiential learning component can be taken for assessment- 25 marks.	2

Table 4 : Practical Training Activity

Practical No	Practical name	Hours
1.1	Demonstration of the available databases comprising information on secondary metabolites	10
1.2	Demonstration and identification of proteins/ metabolites from the databases.	10
1.3	Demonstration of predicting the interactions/disease pathways	10
2.1	Demonstrate the techniques of the Instruments and equipments employed for Analytical pharmacognosy.	10
2.2	Demonstrate the techniques of the Instruments and equipments employed for Analytical pharmacognosy	10
2.3	Operations and applications of the Instruments and equipment used with Chromatographic , Spectrophotometric and in molecular biology and immunoassay techniques	10
3.1	Demonstrate the procedures of albino mouse, albino rat, guinea pig, hamster & rabbit handling technique.	2
3.2	Demonstrate procedures of routes of drug administration's in experimental animals (feeding or oral gavage, injection site & technique- intraperitoneal, intravenous, intramuscular, subcutaneous, intracardiac and blood collection)	4
3.3	Demonstrate procedures of retro-orbital bleeding, dissection and organ collection, methods of Sacrifice and basics of Histopathology (preservation, transportation and microtome sectioning).	4
3.4	Demonstrate drug screening methods of Gross behaviour, CNC activity.	5
3.5	Demonstrate drug screening methods of analgesic, antiinflammatory, antipyretic activity & measuring the strength of mice.	5
4.1	Perform the assessment of Guna by physicochemical tests- 3 drugs for each guna- Guru-Laghu, Snigdha-Ruksha.	8
4.2	Application of the principles of Guna in clinical practice.	2
4.3	Demonstrate the application of Paradi Guna in compounding of drugs and in clinical practices and research.	10

4.4	Demonstrate the significance of Vishishta guna in macroscopic evaluation of crude drugs	6
4.5	Analyze case papers to understand the role of Adhyatma Guna in Psychiatric practice.	4
5.1	Perform the assessment of rasa by taste threshold method. Assess 3 drugs each for Madhura, Amla, Lavana, Katu, Tikta and Kashaya rasas.	9
5.2	Perform the assessment of rasa by Qualitative and quantitative methods using earthworms	9
5.3	Explore different mechanisms of Advanced taste sensors like artificial- lipid membranes and e-tongue.	2
6.1	Performing and interpretation of Vipaka principles by in-vitro experimentation.	10
6.2	Performing and interpretation of Vipaka principles by in-vivo experimentation.	10
6.3	Assessment of Vipaka of selected drugs by the application of Invitro digestion technique.	10
7.1	Demonstrate the assessment of Virya by Membrane transmission model, In-silico model and Endothermic/exothermic reaction.	6
7.2	Perform Network Pharmacology analysis on selected drugs acting by Prabhava in specific diseases.	4

Table 5 : Experiential learning Activity

Experiential learning No	Experiential name	Hours
1.1	Identification of classes of compounds as per different Rasa and comparison of chemical structures of phytoconstituents of Rasa	10
1.2	Identification of classes of compounds as per different Rasa and comparison of chemical structures of phytoconstituents of Rasa.	3
1.3	Comparison of the chemical structures of phytoconstituents as per skandha/varga	10
1.4	Compare the chemical structures of phytoconstituents as per skandha/varga	3
1.5	Interpret the extracted data from databses used for the prediction of interactions/disease pathways using the selected metabolite/ protein	10
1.6	Interpretation of the extracted data from databses used for the prediction of interactions/disease pathways using the selected metabolite/ protein	3
2.1	Familiarise with the principles and applications of the instruments and Equipment (Instruments no. 1 to 12 mentioned under Practical Training 2.1)	8
2.2	Familiarise with the principles and applications of the instruments and Equipment (Instruments no.13 to 24 mentioned under Practical Training 2.1 and 2.2)	10
2.3	Familiarise with the principles and applications of the instruments and Equipment (Instruments no. 25 to 36 mentioned under Practical Training 2.2)	8
2.4	Familiarise with principles and applications of the instruments and Equipment employed for Chromatographic and Spectrophotometric methods.	10
2.5	Familiarise with principles and applications of the instruments and Equipment used in molecular biology and immunoassay techniques.	3
3.1	Identifying the proper techniques of animal handling technique, routes of drug administrations and blood collection.	5
3.2	Acquire the knowledge of conducting of retro-orbital bleeding, dissection and organ collection, methods of sacrifice and basics of histopathology.	8
3.3	Acquire the knowledge of conducting drug screening methods of Gross behaviour, CNC activity.	5
3.4	Acquire the knowledge of conducting of analgesic, anti-inflammatory, antipyretic activity & measuring the strength of mice.	8
4.1	Performing and Practicing the assessment of Guna by physicochemical tests- 3 drugs for each guna- Guru-Laghu, Snigdha-Ruksha.	10
4.2	Practicing the application of Guna in day-to-day clinical practice.	6

4.3	Practicing the application of Paradi Guna in compounding of drugs, in clinical practices and research.	10
4.4	Application of Vishishta guna in Dravya Pareeksha- macroscopic evaluation of crude drugs	9
4.5	Applying Adhyatma guna concepts to patient care.	4
5.1	Exploring the assessment of rasa by different methods.	10
5.2	Designing/ describing a case scenario for promotion of Shadrasa concept in public health.	10
5.3	Execution of the assessment of Rasa by Taste threshold method in different prakruti people and grading of Rasa	3
5.4	Exploring the Phytochemistry of dravyas based on specific rasas.	3
6.1	Assessment of Vipaka of selected drugs by Hydrolysis method	10
6.2	Assessment of Vipaka of selected drugs by real life experience	10
7.1	Exploring different experimental models for assessment of Ushna and Sheeta Virya based on virya action	7
7.2	Analyzing the differences between Prabhava (Specific pharmacological effect) and Samanya karma (general pharmacological effects) based on different criteria.	2
7.3	Exploring the vichitra pratyayarabdha and Prabhava dravyas from classical texts, enlisting them and practicing network Pharmacology steps for selected drug acting by Prabhava in specific diseases.	4

Table 6 : Assessment Summary: Assessment is subdivided in A to H points

6 A : Number of Papers and Marks Distribution

Subject Code	Paper	Theory	Practical	Total
AYPG-AB-DG	1	100	200	300

6 B : Scheme of Assessment (Formative and Summative Assessment)

Credit frame work

AYPG-AB-DG consists of 7 modules totaling 16 credits, which correspond to 480 Notional Learning Hours. Each credit comprises 30 Hours of learner engagement, distributed across teaching, practical, and experiential learning in the ratio of 1:2:3. Accordingly, one credit includes 5 hours of teaching, 10 hours of practical training, 13 hours of experiential learning, and 2 hours allocated for modular assessment, which carries 25 marks.

Formative Assessment : Module wise Assessment:will be done at the end of each module. Evaluation includes learners active participation to get Credits and Marks. Each Module may contain one or more credits.
Summative Assessment: Summative Assessment (University examination) will be carried out at the end of Semester II.

6 C : Semester 2 Calculation Method for Modular Grade Points (MGP)

Module Number & Name (a)	Credits (b)	Actual No. of Notional Learning Hours (c)	Attended Number of notional Learning hours (d)	Maximum Marks of assessment of modules (e)	Obtained Marks per module (f)	MGP =d* f/c*e*100
M1. Digital databases and tools for Dravyaguna: Data mining, analysis and application	3	90		75		
M2. Instruments and Equipment used in Quality control of medicinal plants in Dravyaguna	3	90		75		
M3. Introduction to Experimental Pharmacology	2	60		50		
M4. Guna and their pharmacotherapeutics	3	90		75		
M5. Rasa and their pharmacotherapeutics	2	60		50		
M6. Vipaka and their pharmacotherapeutics	2	60		50		
M7. Virya and Prabhava and their pharmacotherapeutics	1	30		25		
MGP = ((Number of Notional learning hours attended in a module) X (Marks obtained in the modular assessment) / (Total number of Notional learning hours in the module) X (Maximum marks of the module)) X 100						

6 D : Semester Evaluation Methods for Semester Grade point Average (SGPA)

SGPA will be calculated at the end of the semester as an average of all Module MGPs. Average of MGPS of the Semester For becoming eligible for Summative assessment of the semester, student should get minimum of 60% of SGPA

SGPA = Average of MGP of all modules of all papers = add all MGPs in the semester/ no. of modules in the semester

Evaluation Methods for Modular Assessment

A S.No	B Module number and Name	C MGP
1	M1.Digital databases and tools for Dravyaguna: Data mining, analysis and application	C1
2	M2.Instruments and Equipment used in Quality control of medicinal plants in Dravyaguna	C2
3	M3.Introduction to Experimental Pharmacology	C3
4	M4.Guna and their pharmacotherapeutics	C4
5	M5.Rasa and their pharmacotherapeutics	C5
6	M6.Vipaka and their pharmacotherapeutics	C6
7	M7.Virya and Prabhava and their pharmacotherapeutics	C7
	Semester Grade point Average (SGPA)	(C1+C2+C3+C4+C5 +C6+C7) / Number of modules(7)

S. No	Evaluation Methods
1.	Method explained in the Assessment of the module or similar to the objectives of the module.

6 E : Question Paper Pattern

MD/MS Ayurveda Examination
AYPG-AB-DG
Sem II

Time: 3 Hours ,**Maximum Marks:** 100
INSTRUCTIONS: All questions compulsory

		Number of Questions	Marks per question	Total Marks
Q 1	Application-based Questions (ABQ)	1	20	20
Q 2	Short answer questions (SAQ)	8	5	40
Q 3	Analytical based structured Long answer question (LAQ)	4	10	40
				100

6 F : Distribution for summative assessment (University examination)

S.No	List of Module/Unit	ABQ	SAQ	LAQ
(M-1)Digital databases and tools for Dravyaguna: Data mining, analysis and application (Marks: Range 5-20)				
1	**(U-1)** Secondary metabolites in medicinal plants	No	Yes	Yes
2	**(U-2)** Databases for predicting structural relationships	Yes	Yes	Yes
3	**(U-3)** Databases for predicting functional relationships	No	Yes	No
(M-2)Instruments and Equipment used in Quality control of medicinal plants in Dravyaguna (Marks: Range 5-15)				
1	**(U-1)** Instruments and equipment in Analytical pharmacognosy	No	Yes	Yes
2	**(U-2)** Instruments and equipment for advanced Analytical methods	No	Yes	Yes
(M-3)Introduction to Experimental Pharmacology (Marks: Range 5-20)				
1	**(U-1)** Laboratory Animals	Yes	Yes	Yes
2	**(U-2)** Preclinical screening models & Computer aided learning	Yes	No	Yes
(M-4)Guna and their pharmacotherapeutics (Marks: Range 5-20)				
1	**(U-1)** Gurvadi Guna	Yes	Yes	Yes
2	**(U-2)** Paradii Guna	Yes	Yes	Yes
3	**(U-3)** Vishishta Guna & Adhyatma Guna	No	No	Yes
(M-5)Rasa and their pharmacotherapeutics (Marks: Range 5-20)				
1	**(U-1)** Shadrasa	Yes	No	Yes
(M-6)Vipaka and their pharmacotherapeutics (Marks: Range 5-15)				
1	**(U-1)** Vipaka	No	Yes	Yes
(M-7)Virya and Prabhava and their pharmacotherapeutics (Marks: Range 5-15)				
1	**(U-1)** Veerya	No	Yes	No
2	**(U-2)** Prabhava	No	Yes	No

6 G : Instruction for the paper setting & Blue Print for Summative assessment (University Examination)

Instructions for the paper setting.

1. 100 marks question paper shall contain:-
• Application Based Question: 1 No (carries 20 marks)
• Short Answer Questions: 8 Nos (each question carries 05 marks)
• Long Answer Questions: 4 Nos (each question carries 10 marks)
2. Questions should be drawn based on the table 6F.
3. Marks assigned for the module in 6F should be considered as the maximum marks. No question shall be asked beyond the maximum marks.
4. Refer table 6F before setting the questions. Questions should not be framed on the particular unit if indicated “NO”.
5. There will be a single application-based question (ABQ) worth 20 marks. No other questions should be asked from the same module where the ABQ is framed.
6. Except the module on which ABQ is framed, at least one Short Answer Question should be framed from each module.
7. Long Answer Question should be analytical based structured questions assessing the higher cognitive ability.
8. Use the Blueprint provided in 6G or similar Blueprint created based on instructions 1 to 7

6 H : Distribution of Practical Exam (University Examination)

S.No	Heads	Marks
1	Long practicals 1.Assessment of Guna by Physicochemical tests(Any two tests for assessment of Gurvadi gunas to be selected from the practical and experiential learning components of module 4)-30 Marks 2.Assessment of Rasa by taste threshold method -30 Marks 3.Assess the case scenario and choose the appropriate drugs with justification (Case scenario based on Guna)-20 Marks	80
2	Short practicals 1. Macroscopic description of 2 samples (from any two useful part)-20 Marks 2.Application of Databases on medicinal plants (Any two steps as mentioned in the examples below) a. Students are assigned one plant and asked to perform search in databases with different phytoconstituents. b. Provide set of metabolites from available LCMS profile and students are asked to identify proteins or metabolites from respective databases to study the structures. c Provide two or three phytoconstituents, students are asked to study disease pathways by KEGG/ REACTOME. 3. Identify instrument and write its principle and applications (Instruments should be selected from the list mentioned in module 2)-10 Marks 4.Demonstrate Animal handling and restraint techniques for laboratory animals (Mice, rats) OR Describe the given animal experimental model and write its applications (Question should be on the experimental pharmacology models included in module 3)-10 Marks	60
3	**Viva (2 examiners: 20 marks/each examiner)**	40
4	**Logbook (Activity record)**	10
5	**Practical/Clinical Record**	10
Total Marks		**200**

Reference Books/ Resources

06_Dravyaguna

Click here to access References and Resources

Abbreviations

Domain		T L Method		Level	
CK	Cognitive/Knowledge	L	Lecture	K	Know
CC	Cognitive/Comprehension	L&PPT	Lecture with PowerPoint presentation	KH	Knows how
CAP	Cognitive/Application	L&GD	Lecture & Group Discussion	SH	Shows how
CAN	Cognitive/Analysis	L_VC	Lecture with Video clips	D	Does
CS	Cognitive/Synthesis	REC	Recitation		
CE	Cognitive/Evaluation	SY	Symposium		
PSY-SET	Psychomotor/Set	TUT	Tutorial		
PSY-GUD	Psychomotor/Guided response	DIS	Discussions		
PSY-MEC	Psychomotor/Mechanism	BS	Brainstorming		
PSY-ADT	Psychomotor Adaptation	IBL	Inquiry-Based Learning		
PSY-ORG	Psychomotor/Origination	PBL	Problem-Based Learning		
AFT-REC	Affective/ Receiving	CBL	Case-Based Learning		
AFT-RES	Affective/Responding	PrBL	Project-Based Learning		
AFT-VAL	Affective/Valuing	TBL	Team-Based Learning		
AFT-SET	Affective/Organization	TPW	Team Project Work		
AFT-CHR	Affective/ characterization	FC	Flipped Classroom		
		BL	Blended Learning		
		EDU	Edutainment		
		ML	Mobile Learning		
		ECE	Early Clinical Exposure		
		SIM	Simulation		
		RP	Role Plays		
		SDL	Self-directed learning		
		PSM	Problem-Solving Method		
		KL	Kinaesthetic Learning		
		W	Workshops		
		GBL	Game-Based Learning		
		LS	Library Session		
		PL	Peer Learning		
		RLE	Real-Life Experience		
		PER	Presentations		
		D-M	Demonstration on Model		
		PT	Practical		
		X-Ray	X-ray Identification		
		CD	Case Diagnosis		
		LRI	Lab Report Interpretation		

		DA	Drug Analysis		
		D	Demonstration		
		D-BED	Demonstration Bedside		
		DL	Demonstration Lab		
		DG	Demonstration Garden		
		FV	Field Visit		
		JC	Journal Club		
		Mnt	Mentoring		
		PAL	Peer Assisted Learning		
		C_L	Co Learning		
		DSN	Dissection		
		PSN	Prosection		

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