

Annexure-1C5.00: Programme Structure for M.A. in Sabdabodha Systems & Language Technology / M.Sc. in Computer Science & Sanskrit Language Technology / M.Sc. in Yoga Therapy (2-Year Programme)

UGC ME&E Guidelines		Disciplinary Major	Disciplinary Minor	Interdisciplinary - Major		Interdis - Minor				Vocational	Proj / Internship	
UGC CBCS Template		Core Course (CC)		Elective Course			Ability Enhancement Courses (AEC)				Project work (PR) /Dissertation (DS) / Internship (IS)	
				Discipline Specific Elective (DSE)	Generic Elective Course (GE)		Ability Enhancement Compulsory Course (AECC)	Skill Enhancement Course (SEC)				
Col.No.	1	2-CC		3-DSE	4-GE	5-OE	6-ES/CO I	7-LNG	8-VB	9-SEC	10-PR	11
Credits per course >		4		3						1	5	
Sem	Total Courses	Core + Practicals				Open Ele (OE)						Total Credits
I	6	DSC-1 MASB111 Introduction to Paninian Grammar DSC-2 MASB112 Introduction to Process of Sentence understanding		DSE-1						RM & Manuscriptology-1		20

		<p>DSC-3</p> <p>MASB113</p> <p>Introduction to Navya Nyāya</p> <p>DSC-4</p> <p>MASB114</p> <p>Language & Speech Processing I (3 lectures + 1 practicals)</p>									
II	6	<p>DSC-5</p> <p>MASB121</p> <p>Introduction to Paninian Grammar & Etymology</p> <p>DSC-6</p> <p>MASB122</p> <p>शाब्दबोधप्रक्रिया</p> <p>-परिचयः</p>	DSE-2						RM & Manuscriptology-2		20

		<p>DSC-7</p> <p>MASB113</p> <p>Introduction to Paninian Grammar</p> <p>DSC-8</p> <p>MASB114</p> <p>Language & Speech Processing I (3 lectures + 1 practicals)</p>										
EXIT OPTION WITH PG Diploma in (40 CREDITS)												
III	6	<p>DSC-9</p> <p>MASB211</p> <p>Detailed Study of Samasas</p> <p>DSC-10</p> <p>MASB212</p> <p>Introduction to Verbal suffixes</p>		DSE-3							RM & Manuscriptology-3	20

		<p>DSC-11</p> <p>MASB213</p> <p>Language and Linguistics</p> <p>DSC-12</p> <p>MASB214</p> <p>NLP with Python</p>										
IV	5	<p>DSC-13</p> <p>MASB221</p> <p>Sabdabodha Text – I</p> <p>DSC-14</p> <p>MASB222</p> <p>Corpus Linguistics</p> <p>DSC-15</p> <p>MASB223</p> <p>Sabdabodha Text – II</p>	DSE-4							<p>PR-1</p> <p>MASB224</p> <p>Project Work</p>	20	
EXIT OPTION WITH M.A. / M.Sc. in (80 CREDITS)												

**Annexure-1C5.01: List of DSE Courses / Electives for other PG Programmes
(other than Core Course to be chosen)**

Note:- The University reserves all rights, including and not limited to, add / remove a course from the list, reallocate a chosen subject for a student based on the availability of the faculty & other resources at its disposal.

M.A. in Sabdabodha Systems & Language Technology	M.Sc. in Computer Science & Sanskrit Language Technology	M.A. in Hindi	M.Sc. in Yoga Therapy	Masters in Ancient Indian Management Techniques (MAIMT)
1) Vyakarana	1) Vyakarana	1) Sahitya	1) Vyakarana	1) Vyakarana
2) Mimamsa	2) Mimamsa	2) Puranetihasa	2) Mimamsa	2) Mimamsa
3) Nyaya	3) Nyaya	3) Sankhya Yoga	3) Nyaya	3) Nyaya
4) Visistadvaita Vedanta	4) Visistadvaita Vedanta	4) Dharmasastra	4) Visistadvaita Vedanta	4) Visistadvaita Vedanta
5) Dvaita Vedanta	5) Dvaita Vedanta	5) History	5) Dvaita Vedanta	5) Dvaita Vedanta
6) Advaita Vedanta	6) Advaita Vedanta	6) English Literature	6) Advaita Vedanta	6) Advaita Vedanta
7) History	7) History	7) Telugu Literature	7) History	7) History
8) English Literature	8) English Literature	8) Vedic Mathematics	8) English Literature	8) English Literature
9) Telugu Literature	9) Telugu Literature	9) Vedic Literature	9) Telugu Literature	9) Telugu Literature
10)Hindi Literature	10)Hindi Literature	10)Translation	10)Hindi Literature	10)Hindi Literature
11)Vedic Mathematics	11)Vedic Mathematics		11)Vedic Mathematics	11)Vedic Mathematics
12)Vedic Literature	12)Vedic Literature		12)Vedic Literature	12)Vedic Literature
13)Translation	13)Translation		13)Translation	13)Translation

A. Core Course			
Sem	Course Id	Course Name	Credits
I	DSC-MASB1	Introduction to Paninian Grammar	4
	DSC-MASB2	Introduction to Process of Sentence understanding	4
	DSC-MASB3	Introduction to Navya Nyāya	4
	DSC-MASB4	Language and Speech Processing 1	3
	DSC-MASB-P1	Language and Speech Processing Lab 1	1
II	DSC-MASB5	Introduction to Paninian Grammar & Etymology	4
	DSC-MASB6	शब्दबोधप्रक्रियापरिचयः	4
	DSC-MASB7	Introduction to Paninian Grammar	4
	DSC-MASB8	Language and Speech Processing 2	3
	DSC-MASB-P2	Language and Speech Processing Lab 2	1
III	DSC-MASB9	Detailed Study of Samasas	4
	DSC-MASB10	Introduction to Verbal suffixes	4
	DSC-MASB11	Language and Linguistics	4
	DSC-MASB12	NLP with Python	3
	DSC-MASB-P3	NLP with Python Lab	1
IV	DSC-MASB13	Sabdabodha Text – I	4
	DSC-MASB14	Sabdabodha Text – II	4
	DSC-MASB15	Corpus Linguistics	4
	DSC-MASB16	Project and Paper Presentation	5

ANNEXURE -I

Detailed Course Description with Unit division

SEMESTER 1

Course I. MASB1 - Introduction to Paninian Grammar

Course Objectives

1. To introduce the rich tradition of Grammar to the learners
2. To introduce the concept of **Sandhi** (Ach-sandhi only)
3. To introduce the concept of Case-endings and the various meanings they carry, especially the *Karaka theory*

Unit No.	Unit Title	Objectives
I	1.व्याकरणशास्त्रसामान्यपरिचयः 2. अष्टाध्यायीपरिचयः 3.संज्ञाप्रकरणम लघुसिद्धान्तकौमुदी	<i>This unit deals with general introduction to the Vyakarana Sastra, important books and authors, historicity etc and orients the learners in learning the important samjñās</i>
II	अचसन्धिः- लघुसिद्धान्तकौमुदी	<i>Deals about the phonetic changes between vowels.</i>
III	हलसन्धिः- लघुसिद्धान्तकौमुदी विसर्गसन्धिः-लघुसिद्धान्तकौमुदी	<i>Deals about the phonetic changes between consonants and visarga.</i>

IV V	विभक्त्यर्थाः- लघुसिद्धान्तकौमुदी असिद्धत्वविचारः - सामान्यपरिचयः (पूर्वत्रासिद्धम्, असिद्धं बहिरङ्गमन्तरङ्गे) परन्तित्यान्तरङ्गापवादानामुत्तरो तरं बलीयः	<i>Introduction to the meaning of case-endings and the Karaka theory and various sutras dealing with it</i> <i>Special focus on two important meta-rules in Paninian Grammar which decide the hierarchy of the sutras</i>
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Course Outcomes

After finishing the course, the learner would be able to

1. Know the rich tradition of Indian Grammar
2. Know the important authors and the texts in the Grammar tradition
3. Know the different types of Ach-sandhis
4. Know and identify the various Karakas in a basic Sanskrit sentence

Prescribed Texts

1. लघुसिद्धान्तकौमुदी – वरदराजः – गीताप्रेस – गोरखपूर
2. व्याकरणशास्त्रेतिहासः - पं. वेङ्कटरामशास्त्री

Reference Texts

1. वैयाकरणसिद्धान्तकौमुदी – with the commentaries बालमनोरमा – तत्त्वोधिनी – Motilal Banarassidas – 2010 Edition
2. अष्टाध्यायी of Panini
3. The Laghukaumudi of Varadaraja with an English Commentary of JR Ballantyne
4. कारकम् – महाबलेश्वर भट्टः – संस्कृतभारती – बेङ्गलूरु - 1999

Course II. MASB2 - Introduction to the Process of Sentence Understanding

Course Objectives

1. To introduce the concept of Sabdabodha to the learners
2. To introduce the concept of Vrutti and its types
3. To introduce the various theories propounded by various schools of thought with respect to *śakti lakṣaṇā* and *vyañjanā*
4. To introduce the secondary factors involved in the rise of Verbal Cognition

Unit No.	Unit Title	Objectives
I	परमलघुमञ्जूषायाम् -स्फोटभेदाः, वृत्तिस्वरूपम् - तद्भेदाः	<i>Introduction to Paramalaghumañjūṣā, Sphota Theory and types of Sphota. Introduction to vṛtti and its classification</i>
II III	शक्तिस्वरूपम्, मतान्तरनिरासः, शब्दार्थायोः तादात्म्यम्, अपभ्रंशेषु शक्तिविचारः, शक्तिभेदाः, विशेषार्थनिर्णायकाः संयोगादयः	<i>Concept of śakti according to different philosophies, classification and methods to know it.</i>
IV	लक्षणानिरूपणम् - न्यायमते लक्षणापदार्थः, लक्षणानिमित्तानि, लक्षणाबीजम्, लक्षणाभेदाः, लक्षणानिरासः व्यञ्जनानिरूपणम्	<i>Concept of lakṣaṇā according to various schools, its classification Concept of vyañjanā is known</i>

V	शाब्दबोधसहकारिकारणा नि -	<i>Secondary factors for Verbal cognition are known</i>
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Course Outcomes

After finishing the course, the learner would be able to

1. Know the process involved in the rise of Verbal Cognition
2. Know, analyze and compare the different schools of thought and the process involved in the rise of Verbal Cognition
3. Understand the various standpoints put forth on the topic *Vrtti* by various schools of thought.

Prescribed Texts

1. परमलघुमञ्जूषा – नागेशभट्टविरचिता – भावप्रकाशिका(संस्कृत) – बालबोधिनी (हिन्दी)व्याख्योपेता – कृष्णदास अकादमी, वाराणसी

Reference Texts

1. न्यायसिद्धान्तमुक्तावली – विश्वनाथपञ्चाननविरचिता – श्रीकृष्णवल्लभाचार्यकिरणावलीव्याख्योपेता
Chaukhambha Sanskrit Sansthan, Varanasi, 2018 Reprint

Course III. MASB3 Introduction to Navya Nyāya

Course Objectives

1. To introduce the learner to the world of *Saptapadarthas*
2. To familiarize the learner with concept of Prameyas and Pramanas
3. To acquaint learners with the various technical terms of *Navya Nyāya*

Unit No.	Unit Title	Objectives
I	तर्कसंग्रहः प्रत्यक्षखण्डे आरम्भात् द्रव्यप्रकरणपर्यन्तम्	<i>In-depth text reading and explanation of the Dravyas of the Pratyaksa chapter</i>
II	गुणनिरूपणमारभ्य प्रत्यक्षखण्डान्तम्	<i>In-depth text reading and explanation of the Gunas to the end of the Pratyaksa chapter</i>
III	अनुमानखण्डः, उपमानखण्डः	<i>In-depth text reading and explanation of the Anumāna and Upamāna chapters</i>
IV	शब्दखण्डः	<i>In-depth text reading and explanation of the Śabda chapter</i>
V	नव्यन्यायभाषाप्रदीपः धर्मस्वरूपम्, तद्भेदौ जातिरूपाधिश्च, सम्बन्धस्वरूपम्, साक्षात्परम्परासम्बन्धभेदौ, वृत्तिनियामकतदनियामकसम्बन्धस्वरूपम् , वृत्तिनियामकसम्बन्धाः समवायादयः। निर्दिष्टविषयानामध्ययनम् -प्रतियोग्यनुगिभावः, आधाराधेयभावः,	<i>Introduction and In-depth analysis of the concept of relation in Navya Nyāya Language, various classifications and divisions associated with Relations.</i>

व्याप्यवृत्तिः अव्याप्यवृत्तिश्च अभावः, अवच्छेदयावच्छेदकभावः, विशेषणविशेष्यभावः, सविकल्पकनिर्विकल्पकज्ञानस्वरूपम्, विषयविषयिभावः	
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Course Outcomes

After finishing the course, the learner would be able to

1. Know and classify materials into the seven fold classification of *Padarthas*
2. Know and understand the concept of *Lakshana* and do the *samanvaya*
3. Acquire competence in the technical jargon of *Navya Nyāya* and comprehend them.

Prescribed Texts

1. तर्कसंग्रहः - अन्नभट्टः
2. नव्यन्यायभाषाप्रदीपः – महेशन्यायरत्न – Hare Press - Calcutta

Reference Texts

1. Language of Logic, Navya Nyāya Perspective (By Dr.Tirumala Kulkarni & Jaideep Joshi, Published by Manipal University- ISBN 13 - 978-9382460046 - 2013)
2. A Primer of Navya Nyaya Language and Methodology – Navya nyaya bhasapradipa of Maheshchandra Nyayaratna –English Commentary of Ujjwala Jha –Asiatic Society
3. Navyanayabhasapradipa of Mahesh Chandra Nyaya Ratna – Suprabha Commentary of Kalipada Tarkacharya – Sanskrit Colleg,Calcutta - 1956

Course IV. MASB4 Language and Speech Processing – 1 (3 lectures + 1 practicals)

Course Objectives:

1. Provide an introduction to language and speech
2. Introduce the reader to various kinds of expression and operators
3. Orient learners to the concepts of Morphology and Parsing

Unit-I

Introduction: Knowledge in Speech and Language Processing–Ambiguity–Models and Algorithms – Language, Thought and Understanding
– The state of Art and the Near-Term Future - Brief History

Unit-II

Regular Expressions and Automata – Regular Expressions – Basic Regular Expression Patterns – Disjunctin, Grouping, and Precedence-
Advanced Operations

Unit-III

Finite state automata - Using FSA to recognize sheep talk – Formal Languages - Non - deterministic FSAs - Using an NFSA to accept strings – Recognition as Search - Relating Deterministic and Non - Deterministic Automata – Regular Languages and FSAs

Unit-IV

Morphology and Finite State Transducers: English Morphology - Inflectional Morphology - Derivational Morphology - Finite State Morphological Parsing

Unit-V

Combining FST Lexicon and Rules - Lexicon-Free FST - The Porter Stemmer - Human Morphological Processing

Prescribed book:

- Speech and Language Processing–Danial Juafsky, Jamaes H. Martin.

SEMESTER 2

Course I. MASB5 *Introduction to Paninian Grammar & Etymology*

Course Objectives:

1. Provide an introduction to feminine suffixes.
2. Give a sound overview of the Karaka Theory
3. General Introduction to Six Limbs of Vedas with special focus on Nirukta

Unit No.	Unit Title	Objectives
I	स्त्रीप्रत्ययाः – लघुसिद्धान्तकौमुदी	<i>Feminine suffixes of words are dealt with in this unit</i>
II	वैयाकरणासिद्धान्तकौमुदी कारकप्रकरणम्(उपपदविभक्तिः वर्जयित्वा) प्रथमा एवं द्वितीया विभक्तिः	<i>In-depth knowledge of the first and second case-endings in the Karaka chapter are gained</i>
III	तृतीया एवं चतुर्थी विभक्तिः	<i>In-depth knowledge of the third and fourth case-endings in the Karaka chapter are gained</i>
IV	पञ्चमी एवं सप्तमी विभक्तिः	<i>In-depth knowledge of the fifth and seventh case-endings in the Karaka chapter are gained</i>
V	1. निरुक्तम् - प्रथमाध्याये प्रथमपादः 2. वेदाङ्गानां सामान्यपरिचयः	<i>1.Introduction to Nirukta and etymology of words is gained 2.A Brief introduction to the six Vedangas are also taught</i>

Course Outcomes

After finishing the course, the learner would be able to

1. Have a basic knowledge on feminine suffixes
2. Have a keen knowledge on the various Karakas
3. Possess a basic idea of the Vedangas and their contribution to the Vedic Lore

Prescribed Texts

1. लघुसिद्धान्तकौमुदी – वरदराजः – गीताप्रेस – गोरखपूर
2. वैयाकरणसिद्धान्तकौमुदी – with the commentaries बालमनोरमा – तत्त्वबोधिनी – Motilal Banarassidas – 2010 Edition
3. निरुक्तम् - यास्काचार्यकृतम्

Course Objectives:

1. Provide a basic introduction to the process of Sabdabodha
2. Give an in-depth knowledge of the Sabdabodha process for sentences from Tarkasangraha Text

Unit No.	Unit Title	Objectives
I	तर्कसंग्रहशाब्दबोधः द्रव्यप्रकरणे मङ्गलश्लोकात् उद्देश्यप्रकरणपर्यन्तम्	<i>Sabdabodha of the mentioned topics are taught in this unit</i>
II	पृथिवीग्रन्थात् वायुनिरूपणपर्यन्तम्	<i>Sabdabodhas from Pruthivi - Vayu are taught</i>
III	आकाशग्रन्थात् मनोनिरूपणपर्यन्तम्	<i>Sabdabodhas from Aakasa – Manas are taught</i>
IV	पञ्चावयवाः एवं पञ्चहेत्वाभासाः	<i>Sabdabodhas of the Panchavayavas and the Hetvasbhasas are dealt with</i>
V	शब्दखण्डः	<i>Sabdabodhas of the Sabda part are taught.</i>

Course Outcomes

After finishing the course, the learner would be able to

1. Have a basic knowledge on the process of Sabdabodha
2. Chart out Sabdabodha diagrams for most of the sentences of Tarkasangraha
3. Apply this process of making Sabdabodha charts to other sentences in Nyaya / Vyakarana / Mimamsa philosophies

Prescribed Texts

1. तर्कसंग्रहः शाब्दबोधसहितः- गिर्याचार्यव्याख्या – श्रीराघवेन्द्रस्वामिमठः – मन्त्रालयः - 1980

Course III. MASB7 Introduction to Paninian Grammar

Course Objectives:

1. Provide a basic introduction to the concept of Nominal Stems(नामार्थः) according to various schools of thought
2. Introduce Nominal Declensions and their word-building process.

Unit No.	Unit Title	Objectives
I	1. परमलघुमञ्जूषा – नामार्थविचारः 2.शब्दशक्तिप्रकाशिका कारिका 14 – 18 3. न्यायसिद्धान्तमुक्तावली – दिनकरी Pages 281- 282	<i>The meaning of a name or a nominal stem according to Vyakarana and Nyaya theories and their classifications are taught</i>
II	लघुसिद्धान्तकौमुदी अजन्तपुंलिङ्गप्रकरणे अर्थवदधातुरप्रत्ययः प्रातिपदिकम् इति सूत्रात् आदेशप्रत्यययोः इति सूत्रपर्यन्तम्	<i>General introduction to nominal stems and word-building processes pertaining to masculine gender are discussed</i>
III	सर्वादीनि सर्वनामानि इति सूत्रात् पतिः समास एव इति सूत्रपर्यन्तम्	<i>Word building process of Pronouns are discussed</i>
IV	बहुगणवतुडिति संख्या इति सूत्रात् अजन्तपुंलिङ्गप्रकरणान्तम्	<i>Word building process of some more pronouns and special words are discussed</i>
V	अजन्तस्त्रीलिङ्ग – नपुंसकलिङ्गप्रकरणानि	<i>Word building process of feminine and neuter gender words are discussed</i>

Course Outcomes

After finishing the course, the learner would be able to

1. Have a basic knowledge on Nominal Declensions
2. Able to know the declension process for masculine vowel-ending words
3. Able to know the declension process for feminine and neuter gender vowel-ending words

Prescribed Texts

1. लघुसिद्धान्तकौमुदी – वरदराजः – गीताप्रेस – गोरखपूर
2. शब्दशक्तिप्रकाशिका
3. न्यायसिद्धान्तमुक्तावली दिनकरी-रामरुद्रीसहिता - Chaukhambha Sanskrit Sansthan, Varanasi - 1997

Reference Texts

1. वैयाकरणसिद्धान्तकौमुदी – with the commentaries बालमनोरमा – तत्त्वोधिनी –Motilal Banarassidas – 2010 Edition

Course IV. MASB8 Language and Speech Processing 2(3 lectures + 1 practical)

Course Objective :

1. Understanding fundamentals of POS Tagging
2. Get a clear idea of various Grammars
3. To initiate learners to the concept of Semantics and Wordnet

Unit-I

Word Classes and Parts-of-Speech Tagging: English Word Classes – Tagset for English – Parts of Speech Tagging – Rule-based Parts of Speech Tagging – Transformation based Parts of Speech Tagging

Unit-II

Context-Free Grammars for English : Constituency – Context-Free Rules and Trees – Sentence-Level Constructions – The Noun Phrase – Coordination – Agreement – The verb Phrase and Sub categorization – Auxiliaries – Grammar Equivalence and Normal Form – Finite-State and Context-Free Grammars – Grammars and Human processing

Unit-III

Lexical Semantics : Relations Among Lexemes and Their Senses – WordNet – The Internal Structure of Words – Creativity and the Lexicon.

Unit-IV

Discourse – Reference Resolution – Text Coherence – Discourse Structure – Psycholinguistic Studies of Reference and Coherence.

Unit-V

Dialogue and Conversational Agents : What Makes Dialogue Different – Dialogue Acts – Automatic Interpretation of Dialogue Acts – Dialogue Structure and Coherence – Dialogue managers in Conversational Agents.

Prescribed Book:

- Daniel Jurafsky, James H. Martin, Speech and Language Processing 2nd Edition, Pearson Publications, 2009

SEMESTER 3

Course I *MASB9 Detailed Study of Samasas*

Course Objectives:

1. Introduction to the concept of compounds
2. Introduce the various kinds of compounds with examples.

Unit No.	Unit Title	Objectives
I	लघुसिद्धान्तकौमुदी 1. केवलसमासः 2. अव्ययीभावः	<i>Basic introduction to the process of Samasa and knowledge of Avyayibhava compounds are gained in this chapter</i>
II	तत्पुरुषः	<i>Knowledge of Tatpuruṣa compounds are gained in this chapter</i>
III	बह्व्रीहिः	<i>Knowledge of bahuvrihi compounds are gained in this chapter</i>
IV	द्वन्द्वः	<i>Knowledge of dvanda compounds are gained in this chapter</i>
V	समासशक्तिविचारः भूषणसारे केचित् निर्दिष्टविषयाः	<i>An introduction to the Concept of Samasa in different Philosophies as per Bhusanasaram is given in this chapter</i>

Course Outcomes

After finishing the course, the learner would be able to

1. Identify the different types of Samasas
2. Gain knowledge of Samasa-saktivada, wherein ideas of different schools of thought on Samasasakti are discussed

Prescribed Text Book:

1. लघुसिद्धान्तकौमुदी – वरदराजः – गीताप्रेस – गोरखपूर
2. वैयाकरणभूषणसारः - कौण्डभट्टकृतः

Reference Texts

1. वैयाकरणसिद्धान्तकौमुदी – with the commentaries बालमनोरमा – तत्त्वोधिनी – Motilal Banarassidas – 2010 Edition
2. समासपारिजातः – Dr C.Poornananda Sastri – 2003
3. समासः - महाबलेश्वर भट्टः – संस्कृतभारती – बेङ्गलूरु - 2006

Course II MASB10 *Introduction to Verbal suffixes*

Course Objectives:

1. Introduction to the concept of verbal conjugations
2. Introduction to some important /commonly used verbal suffixes with examples.
3. Give insight to the meaning of a Dhatu according to various schools of thoughts

Unit No.	Unit Title	Objectives
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I	लघुसिद्धान्तकौमुदी भूधात्प्रक्रिया	<i>Knowledge about the verbal conjugations of the verb -Bhu</i>
II	एधधात्प्रक्रिया	<i>Knowledge about the verbal conjugations of the verb -Bhu</i>
III	1.णिच् 2.सन् 3. यङन्त 4.यङ्लुक् 5.नामधातवः	<i>Knowledge of various suffixes like nich, san,yan, yanluk etc is gained</i>
IV	1.आत्मनेपदप्रक्रिया 2 परस्मैपदप्रक्रिया 3.भावकर्मप्रक्रिया 4. कर्मकर्तृप्रक्रिया 5. लकारार्थप्रक्रिया 6.कृदन्ते कृत्यप्रकरणम्	<i>Knowledge of various suffixes used in specific usages like Bhavakarma, krdanta krt pratyaya etc is gained.</i>
V	1.“फलव्यापारयोः धातुः” – भूषणसारकारिकाव्याख्या 2. परमलघुमञ्जूषा – धात्वर्थविचारः	<i>Definition of Dhatu according to Bhusanasara and the meaning of a Dhatu as expounded in Paramalaghumanjusa are known.</i>

Course Outcomes

After finishing the course, the learner would be able to

1. Gain a thorough insight into verbal conjugations
2. Possess a sound knowledge on the most commonly used suffixes
3. Know what a Dhatu means and the various discussions related to its meaning

Prescribed Text Book:

1. लघुसिद्धान्तकौमुदी – वरदराजः – गीताप्रेस – गोरखपूर
2. वैयाकरणभूषणसारः - कौण्डभट्टकृतः
3. परमलघुमञ्जूषा – नागेशभट्टविरचिता – भावप्रकाशिका(संस्कृत) – बालबोधिनी (हिन्दी)व्याख्योपेता – कृष्णदास अकादमी, वाराणसी

Reference Texts

1. वैयाकरणसिद्धान्तकौमुदी – with the commentaries बालमनोरमा – तत्त्वोधिनी –Motilal Banarassidas – 2010 Edition

Course III MASB11 *Language and Linguistics***Course Objectives:**

1. General introduction to the study of languages
2. Introduction to Sanskrit Language from a Linguistic perspective
3. General insight into Morphology, Phonology and Phonetic changes in Sanskrit

Unit No.	Unit Title	Objectives
I	1. Definition and Classification of Languages. Morphological Classification Genealogical Classification	<i>General introduction to language, process of communication and classification of languages into various families are dealt in this unit</i>

II	<p>1. Theories on the origin of Languages. Old and Modern.</p> <p>Bow Vow, Pooh Pooh, Ding Dong, Ye-he-ho theories.</p> <p>2. History of Indo-Aryan Languages.</p> <ol style="list-style-type: none"> 1. Old Indo Aryan 2. Middle Indo Aryan 3. Modern Indo Aryan 	<p><i>Theories on origin of languages and history of the indo- Aryan languages and their respective divisions</i></p>
III	<p>Phonology.</p> <ol style="list-style-type: none"> 1. तालव्यादिस्थानानि 2. तालव्यादिवर्णाः 3. आभ्यन्तरप्रयत्नः 4. बाह्यप्रयत्नः 5. स्पर्शाः अन्तः स्थाः, ऊष्माणः, स्वराः, अनुनासिकाः 6. ध्वनिपरिवर्तनकारणानि 	<p><i>Basic introduction to phonology. Equivalent terms in Sanskrit Grammar and reasons for phonetic changes are known</i></p>
IV	<p>Introduction of Morphology</p>	<p><i>Introduction to the concept of Morphology</i></p>
V	<p>A) Types of Phonetic Changes</p> <ol style="list-style-type: none"> 1. लोपः 2. आगमः 3. विपर्ययः (Metathesis) 4. समीकरणम् (Assimilation) 5. विषमीकरणम् (Dissimilation) 6. सन्धिः 7. अनुनासिकता (Nasalization) 	<p><i>Various types of phonetic changes and similar concepts in Sanskrit Grammar are known</i></p>

<p>8.वर्णागमो वर्णविपर्ययश्च द्वौ चापरौ वर्णविकारनाशौ धातोस्तथार्थतिशयेन योगस्तदुच्यते पंचविधं निरुक्तम्॥</p> <p>B) Semantics Primary meaning, Secondary meaning, semantic changes. (अर्थसंकोचादयः), causes of semantic changes.</p>	
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Course Outcomes

After finishing the course, the learner would be able to

1. Gain basic knowledge in Linguistics
2. Know about the origin and classification of languages
3. Know about the place of Sanskrit in the classification of languages
4. Gain thorough understanding about the various phonetic changes occurring in Sanskrit

Prescribed Text Book:

1. An Introduction to Sanskrit Linguistics, M.Sriman Narayana Murti by D.K. Publications, Delhi
2. लघुसिद्धान्तकौमुदी – वरदराजः – गीताप्रेस – गोरखपूर

Reference Texts

1. भाषाशास्त्रप्रवेशिनी – RS Venkatarama Sastri – Kuppaswami Research Institute – Madras - 1996
2. Language – Bloomfield – Motilal Banarasidass
3. भाषाशास्त्रसंग्रहः – STG Varadacharya
4. Theories of Language: Oriental and Occidental – Prof Korada Subramanyam
5. इन्द्रविजयः - Prof Madhusudhan Ojha

Course IV *MASB12* - NLP with Python (3 lectures + 1 practical)

Unit-I

Language Processing and Python: Computing with Language:Texts and Words. Handling Text using Python List. Computing with Language:Simple Statistics- Frequency Distributions etc. Making Decisions and Taking control using Python. Automatic Natural Language Understanding

Unit-II

Accessing Text Corpora and Lexical Resources: Accessing Text Corpora-Gutenberg Corpus,Web and Chat text, Brown Corpus, Reuter Corpus,Inaugural Address Corpus -Corpora in other Languages. Conditional Frequency Distributions. Lexical Resources-Wordlist Corpora, Pronouncing Dictionary, Comparative Word Lists, Shoebox and Toolbox Lexicons. WordNet: The WordNet Hierarchy, Lexical Relations, Smantic Similarity

Unit-III

Processing Raw Text: Accessing Text from the Web and from Disk- Electronic Books-Dealing with HTML, Processing Search Engine Results, Processing RSS Feeds, Extracting Text from PDF, MSWod and other Binary Formats. Strings:
Text Processing at the Lowest Level: Basic operations with strings Accessing Individual Characters, Accessing Substrings, More operation Strings, The Difference between Lists and Strings. Text Processing with Unicode. Regular Expressions for Detecting Word Patterns. Useful Applications of Regular Expressions Extracting Word Pieces, Finding Word Stems, Searching Tokenized Text. Normalizing Text: Stemmers, Lemmatizations. Segmentation- Formatting:From Lists Strings

Unit-IV

Supervised Classification, Examples of Supervised Classification, Evaluation, Decision Trees, Naive Bayes Classifiers, Maximum Entropy Classifiers, Modeling Linguistic Patterns

Unit-V

Categorizing and Tagging Words: Using a Tagger, Tagged Corpora, Mapping Words to Properties Using Python Dictionaries, Automatic Tagging, N-Gram Tagging, Transformation-Based Tagging, How to Determine the Category of a Word

Prescribed Text - Natural Language Processing with Python, Steven Bird, EDwanLein and EduwardLoper, O'reilly(isbn978-0-596-51649-9)

Reference Text : - Text Analytics with Python, Dipanjan Sarkar

SEMESTER – 4

Course I MASB13 Sabdabodha Text – I

Course Objective:

1. In-depth knowledge of the Sabdakhanda portion of Siddhantamuktavali
2. Know about the process of Sabdabodha, Vritti and its classification
3. Introduce the secondary factors for Sabdabodha

Unit No.	Unit Title	Objectives
I	न्यायसिद्धान्तमुक्तावली शब्दखण्डः- ● पदज्ञानं तु करणमिति कारिकाव्याख्यानम् ● शक्तिस्वरूपम् ● शक्तिग्राहकानि ● आख्यातशक्तिवादः ● घटादिपदानां कार्यान्वितघटादौ	<i>In-depth knowledge on the process of Verbal Testimony. Definition of Sakti and methods of Saktigraha are known</i>
II	शक्तिविचारः ● जातिशक्तिवादः ● यौगिकादिपदभेदाः	<i>Refutation of the Mimamsa theory of Jatisakti and the four-fold classification of word</i>
III	लक्षणास्वरूपम् - तद्भेदाः	<i>In-depth knowledge on the denotative function of words</i>

		<i>and the classification of Laksana is known</i>
IV	समासे लक्षणानिरासः	<i>Analysis of Laksana in various compounds words in done</i>
V	शाब्दबोधकारणानि आकाङ्क्षादीनि	<i>Secondary causes for Verbal Testimony are known</i>

Course Outcomes

After finishing the course, the learner would be able to

1. Gain proper exposure into the process of Verbal Cognition
2. Know about the various levels in the process of Verbal Cognition and the various contributing factors

Prescribed Text Books :

1. न्यायसिद्धान्तमुक्तावली- विश्वनाथपञ्चाननविरचिता श्रीकृष्णवल्लभाचार्यकिरणावलीव्याख्योपेता Chaukhambha Sanskrit Sansthan, Varanas, 2018 Reprint

Course II MASB14 Sabdabodha Text – II (शाब्दबोधमीमांसा – एन्.एस्.आर्.ताताचार्यः)

Course Objective:

1. To give an overall picture of Sabdapramana as per various schools of thought
2. Introduce the various definition of terms like Sabda, Vakya, Vakayatha etc as per different philosophies and authors
3. Give insight into concepts like *Abhitanvaya* and *Anvitaabhidaana*

(प्रथमभागः – भूमिकामात्रम्)

Unit No.	Unit Title	Objectives
I	1. शब्दस्याप्रामाण्यनिरासः 2. न्यायदर्शने शब्दस्य पृथक् प्रामाण्यम् 3. शब्दस्यानुमानत्वमिति दिङ्नागमतखण्डनम् 4. शब्दस्य प्रमाणान्तरत्वसाधनम्	<i>Various topics relating to Sabda and the need to accept it as an independent means of valid knowledge are known</i>
II	1. शब्दलक्षणम् – विभिन्नमतपरिचयः 2. वाक्यस्वरूपपरिचयः	<i>Definition of Sabda and Vakya according to various philosophies are known</i>
III	वाक्यार्थविचारः – विभिन्नमतसामान्यपरिचयः	<i>Definition of Vakayatha according to different philosophies is known</i>
IV	मतभेदेन स्फोटतत्खण्डनपरिचयः	<i>Concept of Sphota and various theories relating to it are known</i>

V	1.अभिहितान्वय – अन्विताभिधानवादपरिचयः 2.मतत्रयरीत्या एकस्मिन् वाक्ये शाब्दबोधः 3.शाब्दबोधे मुख्यविशेष्यविचारः	<i>The concepts of Abhitanvaya and Anvitaabhidaana are known. The concept of the Viseshya according to various philosophies is also known</i>
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Course Outcomes

After finishing the course, the learner would be able to

1. Know about importance of Sabdapramana
2. Distinguish between the different definitions of various schools of thought
3. Have a clear picture of important concepts of Verbal Cognition like *Abhitanvaya and Anvitaabhidaana*
4. Comprehend the definitions of secondary factors of Sabdabodha according to different philosophies

Prescribed Textbooks:

1. शाब्दबोधमीमांसा - एन्.एस्.आर्.ताताचार्यः – Part 1 – Institut Francias de Pondicherry/ RS Vidyapeetha-2006

Course III *MASB15* Corpus Linguistics

Unit-I

Introduction to Corpus Linguistic, Mode of communication, Corpus-based versus corpus-driven linguistics, Data collection regimes, Annotated versus unannotated corpora, Total accountability versus data selection, Monolingual versus multilingual corpora

Unit-II

Accessing and analyzing corpus data, Corpus annotation, Introducing concordances, A historical overview of corpus analysis tools, Statistics in corpus linguistics. The web, laws and ethics, The web and legal issues, Ethical issues

Unit-III

English Corpus Linguistics: University College London (UCL), Lancaster University, University of Birmingham, UniversiteCatholique de Louvain, University of Nottingham, Northern Arizona University and the USA

Unit-IV

Corpus-based studies of synchronic and diachronic variation: Diachronic change from Old English to Modern English, Diachronic variation in contemporary Modern English, The multi-dimensional approach to variation , Corpora and variationist sociolinguistics

Unit-V

Neo-Firthian corpus linguistics: Collocation, Discourse, Semantic prosody and semantic preference, Lexis and grammar. Corpus-as-theory versus corpus-as-method, Sinclair's contribution to corpus linguistics Corpus methods and functionalist linguistics: Functionalism in linguistics: a brief overview, Corpus-based research from a functionalist perspective, Corpora and typology, Corpora and cognitive approaches to linguistics, Corpora in the analysis of metaphor

Prescribed Book

- Corpus Linguistics:Method, Theory and Practice,TONY MCENERY AND ANDREW HARDIE,ISBN 978-0-521-83851-1 (hardback)

Course IV MASB16 *Major Project Work (5 credits)*

Course Objective:

In this course, students carry out a project work on the various concepts they have learned during the previous courses. The project work acts as a testing bed to the various theories and computational concepts learnt by them and helps them gain new insights in the field of Sanskrit Computational Linguistics

B. Disciplinary Specific Elective(DSE)			
Sem	Course Id	Course Name	Credits
I	DSE-MASB1	Introduction to Paninian Grammar	3
II	DSE-MASB2	शब्दबोधप्रक्रियापरिचयः	3
III	DSE-MASB3	Language and Linguistics	3
IV	DSE-MASB4	न्यायसिद्धान्तमुक्तावली शब्दखण्डः	3

Course I. DSE-MASB1- Introduction to Paninian Grammar

Course Objectives

1. To introduce the rich tradition of Grammar to the learners
2. To introduce the concept of **Sandhi** (Ach-sandhi only)
3. To introduce the concept of Case-endings and the various meanings they carry, especially the *Karaka theory*

Unit No.	Unit Title	Objectives
I	1.व्याकरणशास्त्रसामान्यपरिचयः 2. अष्टाध्यायीपरिचयः 3.संज्ञाप्रकरणम् लघुसिद्धान्तकौमुदी	<i>This unit deals with general introduction to the Vyakarana Sastra, important books and authors, historicity etc and orients the learners in learning the important samjñās</i>
II	अच्सन्धिः- लघुसिद्धान्तकौमुदी	<i>Deals about the phonetic changes between vowels.</i>
III	हल्सन्धिः- लघुसिद्धान्तकौमुदी विसर्गसन्धिः-लघुसिद्धान्तकौमुदी	<i>Deals about the phonetic changes between consonants and visarga.</i>
IV V	विभक्त्यर्थाः- लघुसिद्धान्तकौमुदी असिद्धत्वविचारः सामान्यपरिचयः (पूर्वत्रासिद्धम्, असिद्धं बहिरङ्गमन्तरङ्गे) परन्त्यान्तरङ्गापवादानामुत्तरो तरं बलीयः	<i>Introduction to the meaning of case-endings and the Karaka theory and various sutras dealing with it</i> <i>Special focus on two important meta-rules in Paninian Grammar which decide the hierarchy of the sutras</i>

Course Outcomes

After finishing the course, the learner would be able to

1. Know the rich tradition of Indian Grammar
2. Know the important authors and the texts in the Grammar tradition
3. Know the different types of Ach-sandhis
4. Know and identify the various Karakas in a basic Sanskrit sentence

Prescribed Texts

- लघुसिद्धान्तकौमुदी – वरदराजः – गीताप्रेस – गोरखपूर
- व्याकरणशास्त्रेतिहासः - पं. वेङ्कटरामशास्त्री

Reference Texts

- वैयाकरणसिद्धान्तकौमुदी – with the commentaries बालमनोरमा – तत्त्वबोधिनी –Motilal Banarassidas – 2010 Edition
- अष्टाध्यायी of Panini
- The Laghukaumudi of Varadaraja with an English Commentary of JR Ballantyne
- कारकम् – महाबलेश्वर भट्टः – संस्कृतभारती – बेङ्गलूरु - 1999

Course II. DSE-MASB2 शाब्दबोधप्रक्रियापरिचयः

Course Objectives:

1. Provide a basic introduction to the process of Sabdabodha
2. Give an in-depth knowledge of the Sabdabodha process for sentences from Tarkasangraha Text

Unit No.	Unit Title	Objectives
I	तर्कसंग्रहशाब्दबोधः द्रव्यप्रकरणे मङ्गलश्लोकात् उद्देश्यप्रकरणपर्यन्तम्	<i>Sabdabodha of the mentioned topics are taught in this unit</i>
II	पृथिवीग्रन्थात् वायुनिरूपणपर्यन्तम्	<i>Sabdabodhas from Pruthivi - Vayu are taught</i>
III	आकाशग्रन्थात् मनोनिरूपणपर्यन्तम्	<i>Sabdabodhas from Aakasa – Manas are taught</i>
IV	पञ्चावयवाः एवं पञ्चहेत्वाभासाः	<i>Sabdabodhas of the Panchavayavas and the Hetvasbhasas are dealt with</i>
V	शब्दखण्डः	<i>Sabdabodhas of the Sabda part are taught.</i>

Course Outcomes

After finishing the course, the learner would be able to

1. Have a basic knowledge on the process of Sabdabodha
2. Chart out Sabdabodha diagrams for most of the sentences of Tarkasangraha
3. Apply this process of making Sabdabodha charts to other sentences in Nyaya / Vyakarana / Mimamsa philosophies

Prescribed Texts

1. तर्कसंग्रहः शाब्दबोधसहितः- गिर्याचार्यव्याख्या – श्रीराघवेन्द्रस्वामिमठः – मन्त्रालयः - 1980

Course III DSE-MASB3 Language and Linguistics

Course Objectives:

- 1) General introduction to the study of languages
- 2) Introduction to Sanskrit Language from a Linguistic perspective
- 3) General insight into Morphology, Phonology and Phonetic changes in Sanskrit

Unit No.	Unit Title	Objectives
I	<p>1. Definition and Classification of Languages.</p> <p style="text-align: center;">Morphological Classification Genealogical Classification</p>	<p><i>General introduction to language, process of communication and classification of languages into various families are dealt in this unit</i></p>
II	<p>1. Theories on the origin of Languages. Old and Modern.</p> <p>Bow Vow, Pooh Pooh, Ding Dong, Ye-he-ho theories.</p> <p>2. History of Indo-Aryan Languages.</p> <ol style="list-style-type: none"> 1. Old Indo Aryan 2. Middle Indo Aryan 3. Modern Indo Aryan 	<p><i>Theories on origin of languages and history of the indo- Aryan languages and their respective divisions</i></p>
III	<p>Phonology.</p> <ol style="list-style-type: none"> 1. तालव्यादिस्थानानि 2. तालव्यादिवर्णाः 3. आभ्यन्तरप्रयत्नः 4. बाह्यप्रयत्नः 5. स्पर्शाः अन्तः स्थाः, ऊष्माणः, स्वराः, अनुनासिकाः 	<p><i>Basic introduction to phonology.</i> <i>Equivalent terms in Sanskrit Grammar and reasons for phonetic changes are known</i></p>

	6. ध्वनिपरिवर्तनकारणानि	
IV	Introduction of Morphology	<i>Introduction to the concept of Morphology</i>
V	<p>A) Types of Phonetic Changes</p> <ol style="list-style-type: none"> 1. लोपः 2. आगमः 3. विपर्ययः (Metathesis) 4. समीकरणम् (Assimilation) 5. विषमीकरणम् (Dissimilation) 6. सन्धिः 7. अनुनासिकता (Nasalization) <p>8. वर्णागमो वर्णविपर्ययश्च द्वौ चापरौ वर्णविकारनाशौ धातोस्तथार्थतिशयेन योगस्तदुच्यते पंचविधं निरुक्तम्॥</p> <p>B) Semantics</p> <p>Primary meaning, Secondary meaning, semantic changes. (अर्थसंकोचादयः), causes of semantic changes.</p>	<i>Various types of phonetic changes and similar concepts in Sanskrit Grammar are known</i>

Course Outcomes

After finishing the course, the learner would be able to

- 1) Gain basic knowledge in Linguistics
- 2) Know about the origin and classification of languages
- 3) Know about the place of Sanskrit in the classification of languages
- 4) Gain thorough understanding about the various phonetic changes occurring in Sanskrit

Prescribed Text Book:

- An Introduction to Sanskrit Linguistics, M.Sriman Narayana Murti by D.K. Publications, Delhi
- लघुसिद्धान्तकौमुदी – वरदराजः – गीताप्रेस – गोरखपूर

Reference Texts

1. भाषाशास्त्रप्रवेशिनी – RS Venkatarama Sastri – Kuppuswami Research Institute – Madras - 1996
2. Language – Bloomfield – Motilal Banarasidass
3. भाषाशास्त्रसंग्रहः – STG Varadacharya
4. Theories of Language: Oriental and Occidental – Prof Korada Subramanyam
5. इन्द्रविजयः - Prof Madhusudhan Ojha

Course IV DSE-MASB4 Sabdabodha Text – I

Course Objective:

4. In-depth knowledge of the Sabdakhanda portion of Siddhantamuktavali
5. Know about the process of Sabdabodha, Vritti and its classification
6. Introduce the secondary factors for Sabdabodha

Unit No.	Unit Title	Objectives
I	न्यायसिद्धान्तमुक्तावली शब्दखण्डः- <ul style="list-style-type: none"> ● पदज्ञानं तु करणमिति कारिकाव्याख्यानम् <ul style="list-style-type: none"> ● शक्तिस्वरूपम् ● शक्तिग्राहकानि ● आख्यातशक्तिवादः ● घटादिपदानां कार्यान्वितघटादौ 	<i>In-depth knowledge on the process of Verbal Testimony. Definition of Sakti and methods of Saktigraha are known</i>
II	शक्तिविचारः <ul style="list-style-type: none"> ● जातिशक्तिवादः ● यौगिकादिपदभेदाः 	<i>Refutation of the Mimamsa theory of Jatisakti and the four-fold classification of word</i>
III	लक्षणास्वरूपम् - तद्भेदाः	<i>In-depth knowledge on the denotative function of words and the classification of Laksana is known</i>
IV	समासे लक्षणानिरासः	<i>Analysis of Laksana in various compounds words in done</i>
V	शाब्दबोधकारणानि आकाङ्क्षादीनि	<i>Secondary causes for Verbal Testimony are known</i>

Course Outcomes

After finishing the course, the learner would be able to

3. Gain proper exposure into the process of Verbal Cognition
4. Know about the various levels in the process of Verbal Cognition and the various contributing factors

Prescribed Text Books :

2. न्यायसिद्धान्तमुक्तावली- विश्वनाथपञ्चाननविरचिता श्रीकृष्णवल्लभाचार्यकिरणावलीव्याख्योपेता Chaukhambha Sanskrit Sansthan, Varanas, 2018 Reprint

ANNEXURE II

MODEL QUESTION PAPER

I. एकेन वाक्येन उत्तरं ददत

1*10= 10

1. तर्कसङ्ग्रहस्य कर्ता कः ?

2. तर्कसङ्ग्रहस्य मङ्गलश्लोकः कः

3. सामान्यम् कतिविधम्
4. विभुत्वं नाम किम्
5. वायोः किं लक्षणम्
6. सुखाद्युपलब्धिसाधनमिन्द्रियं किम्
7. संयोगनाशको गुणः कः
8. गुरुत्वलक्षणं किम्
9. कारणं कतिविधम्
10. इन्द्रियार्थसन्निकर्षजन्यं ज्ञानं किम्

II. द्वयोः समाधानं लिखत

2*15 = 30

1. कारणत्रैविध्यं सविस्तरं विवेचयत
2. षड्विधसन्निकर्षान् प्रतिपादयत
3. अनुमानद्वैविध्यं निरूपयत
4. शाब्दबोधप्रक्रियां तत्सहकारिकारणानि च प्रतिपादयत

III. द्वयोः समाधानं लिखत

2*10 = 20

1. शाब्दबोधसहितं ससमन्वयं पृथिवीलक्षणं लिखत
2. सप्रभेदं स्पर्शं निरूपयत
3. कालं निरूपयत
4. सव्यभिचारं सप्रभेदं निरूपयत

IV. द्वयोः समाधानं लिखत

2*5 = 10

1. व्याप्तिलक्षणं लिखत
2. अन्वयव्याप्तिं निरूपयत
3. व्यतिरेकव्याप्तिं निरूपयत
4. उपमितिं निरूपयत