

Handling Conjugations of Active Verbs of Sanskrit in Machine Translation

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Abstract – Conjugations are the inflections of verbs, as well as inflections of nouns and pronouns are known as declensions. Declensions are not discussed in the paper. Sentences of any language become meaningful with the inclusion of conjugations only. Only nouns (and pronouns) and verbs are derived to various forms in Sanskrit. Conjugations play an important role in Machine Translation (MT) in improving accuracy since they contain lot of information about the sentence, especially in Sanskrit. In general, in any language, verbs can be derived in to various forms to give various meanings. Conjugations of Sanskrit are derived into six tenses and four moods. Handling of the tenses and moods of active verbs in MT of Sanskrit are discussed in this paper.

Keywords: Conjugations, tenses of Sanskrit verbs, machine translation, morphological analysis.

1. INTRODUCTION

Vocabulary of Sanskrit is briefly categorized in to three types; *subantas*, *tijantas* and *avyayas* by ancient Sanskrit grammarians of India as in Table 1 [3] [15].

Table 1: Classification of terminology of Sankrit

Category	Description	Example
<i>subanta</i>	Non-verbs	<i>krishNaH, sItA, vRksham</i> , etc
<i>tijanta</i>	Verbs	<i>kri, dhav, bhid</i> , etc
<i>avyayAs</i>	Indeclinable words	<i>yadA, tadA, adya</i> etc

Verbs in Sanskrit are known as धातुः (*dhAtus*) – the meaning bearing terms which are classified as तिजन्त शब्दाः (*tijanta SabdAs*) in Sanskrit since they end in तिङ् प्रत्यय (*tiG pratyaya* – *tiG* affixes). Sanskrit root verbs are categorized into ten गण (*gaNa* - class), by Panini around 2000 BC in his book धातु पाठः (*dhAtu pAthaH* - Lessons of root verbs) [1]. Every class has been named after the verb it begins with, as in Table 2. The verbs that belong to first nine classes are considered primitive roots since they differ from the derivative verbal bases. In the case of primitive roots, the personal terminations and the characteristic marks of the various tenses and moods are (with some modifications in the Present and Imperfect) combined with the simple and unmodified root [2]. E.g. the root *yA* (to Go) can be derived to its present tense as ‘*yAti*’ and to its simple future as ‘*yAsyati*’.

Primitive roots can be conjugated in three voices, viz. active voice (*parasmaipada* – the voice for others), reflexive voice (*AtmanEpada* - the voice for self) and the passive voice [4]. Passive voice is not considered in the paper.

Every root verb can be accented by affixing a विकरण प्रत्यय (*vikaraNa pratyaya*) - specific to each *gaNa*; and a पुरुष प्रत्यय (*purusha pratyaya*) - specific to each tense, as listed in Table 2 [5][6]. For instance, भू (*bhU* - first root verb of भ्वादि गण - *bhvAdi gaNa*) becomes भवति (*bhavati*) when accented to *laT* by affixing grammatically विकरण प्रत्यय of भ्वादि गण, अ (*a*) and पुरुष प्रत्यय of *laT*, ति to the root verb भू (*bhU*) (भू + अ + ति - *bhu + a + ti*) [7].

Root verb is converted into a base verb (i.e. ‘*bhav*’) as per the rules of Sanskrit grammar (as described in Table A3 of Appendix A), and concerned *vikaraNa pratyaya* and *purusha pratyaya* of the class are combined together to form the final affix (i.e. ‘*ati*’). Finally, the base verb and the affix give the conjugation (i.e. *bhav + ati = bhavati*). For some cases, verbs should be prefixed with the vowel ‘*a*’ for specific tenses (as described in Table A3 and A4 of Appendix A) to form their conjugations. This is known as augmenting. E.g. the *dhatu bhU* becomes *abhavat* in its past imperfect tense (*a + bhav + at*). For some cases, the first consonant or its relative consonant is prefixed to the base verb. The process is known as reduplication and the prefixing consonant is known as reduplicative syllable [8]. E.g. Past perfect tense of *dhAtu ‘Subh’* is ‘*SuSubhE*’ as described in Table A4, appendix A

upasargas (prepositions) can also be prefixed to the verbs. But they are not considered in this paper, since they are not the part of basic conjugation. The prepositions are prefixed for emphasizing or to generate different meaning to verb externally [9].

Table 2 *gaNAs* (classes) of Sanskrit verbs

<i>gaNam</i>	First <i>dhAtu</i>	<i>vikaraNa</i>	No. of verbs
भ्वादि (<i>bhvAdi</i>)	भू (<i>bhU</i>)	अ (<i>a</i>)	1035
अदादि (<i>adAdi</i>)	अद् (<i>ad</i>)	-	71
जुहोत्यादि (<i>juhOtyadi</i>)	हु (<i>hu</i>)	-	24
दिवादि (<i>divAdi</i>)	दिव् (<i>div</i>)	य (<i>ya</i>)	141
स्वादि (<i>svAdi</i>)	सु (<i>su</i>)	तु (<i>nu</i>)	34
तुदादि (<i>tudAdi</i>)	तुद् (<i>tud</i>)	अ (<i>a</i>)	155
रुधादि (<i>rudhAdi</i>)	रुध् (<i>rudh</i>)	न (<i>na</i>)	25
तनादि (<i>tanAdi</i>)	तन् (<i>tan</i>)	उ (<i>u</i>)	10
क्र्यादि (<i>kryAdi</i>)	क्रि (<i>kri</i>)	ना (<i>nA</i>)	62
चुरादि (<i>curAdi</i>)	चुर् (<i>cur</i>)	अय (<i>aya</i>)	410
Total			1967

Exception: Few roots belong to more than one class: for example:

- The root verbs भ्रश् (*bhraS*), भ्लाश् (*bhlAS*), भ्रम् (*bhram*), क्रम् (*kram*), क्लम् (*klam*), त्रस् (*tras*), त्रुट् (*truT*), लश् (*laS*) belong to the classes भू (*bhU*) as well as दिव् (*div*).
- The root verbs स्कु (*sku*), स्तम्भ् (*stambh*), स्तुम्भ् (*stumbh*), स्कम्भ् (*skambh*), स्कुम्भ् (*skumbh*), belong to the classes सु (*su*) as well as क्रि (*kr*).

Their accents will also be changed accordingly with the rules defined for the class concerned. For example, भ्रश् (*bhraS*) => भ्राशते (*bhrASatE*) and भ्राश्यते (*bhrASyatE*) for for भू (*bhU*) class and दिव् (*div*) class respectively.

Verbs of Sanskrit are classified into three types from the result of the action performed aspect: आत्मने पदि (*AtmanEpadi* - reflexive verb), परस्मै पदि (*parasmYpadi* - transitive verb) and उभय पदि (*ubhayapadi* - both) [10] [11]. Root verbs can be accented into 3 types for first, second and third persons and further accented into 3 types for singular, dual and plural forms of each person, by affixing तिङ् प्रत्यय (*tiG pratyayas*). Hence, a root verb can get into nine forms (either as reflexive or as transitive), as listed in Tables A1 through A3 of Appendix A [12].

Thus each verb can get into 90 forms by conjugating it using 10 tenses. There are approximately nineteen hundred and seventy root verbs in Sanskrit; hence they can get into a mammoth total of around 1.75 lakh forms. There are eighteen important *upasargas* (उपसर्गाः – verb prepositions or prefixes) in Sanskrit (Table A5 of Appendix A). These are used either to emphasize the action of verb or to change its meaning completely by prefixing it to verb [13]. One root verb can be prefixed with more than one prefix also [14]. These prefixes increase the number of verbs exponentially. With multitudinous combinations, of incomplete, interrogative, negative, causative, passive verbs, etc. the count of verb formations can shoot up beyond a million. But all the forms that are mentioned above are not considered in this paper. Only active voiced, complete verbs are considered.

Verbs of Sanskrit can be derived into six tenses (one present, three past and two future), viz. - लट् (*laT*), लङ् (*laG*), लिट् (*liT*), लृङ् (*luG*), लुट् (*luT*), लृट् (*lRT*); and four moods, viz. लोट् (*lOt*), विधिलिङ् (*vidhiliG*), आशीर्लिङ् (*ASIrliG*), लृङ् (*IRG*) [16]. Moods and tenses do not mix; however, all 10 entities fall broadly under the head tenses and are called लकारः (*lakArAs*). Four tenses and moods will require modification of root verb known as conjugational (*laT*, *laG*, *lOT*, *vidhiliG*) and the rest are known as non-conjugational (*liT*, *luT*, *lRT*, *ASIrliG*, *IRG*) tenses [17]. One more *lakAra* namely लेट् (*lET*) was mentioned in Sanskrit grammar which was used only in Vedic literature [18].

Though there are around 1970 roots in Sanskrit, many of them are identified synonyms, e.g. अर्द् (*bhvaDi* – *bhvAdi*), इ (*adAdi* – *adAdi*), इष् (*divAdi* – *divAdi*), ईर् (*adAdi* – *adAdi*), ऋ (*bhvaDi* – *bhvAdi*), क्षि (*tudAdi* – *tudAdi*), गम् (*bhvaDi* – *bhvAdi*), etc. are the synonyms of the verb – “to Go”. By considering this, only around 500 primary Sanskrit verbs were employed in the MT.

2. MORPHOLOGICAL ANALYSIS

MT process starts with preprocessing of the given input string. As a part of that, the input string is tokenized into tokens. For translation of verb forms, i.e. conjugations, every token is examined for whether it is a conjugation. A token is identified as a conjugation if the token is terminated with any of the affixes that are given in Table A2 of Appendix A. For instance, the token *SObhAvahE* (शोभावहे – means “We both are glorious”) is terminated with the affix ‘*vahE*’, hence it is identified as a conjugation.

The identified (conjugation) token is further segmented into two parts, namely, stem and affix (E.g. *SObhAvahE* => *SObh* + *AvahE*; assuming the token doesn't have *upasargas* in it). The stem is checked for the presence of any *upasargas* (prefixes) in it. If the stem is started with any of the *upasargas* that are listed in the Table A5 of Appendix A, the *upasarga* part also separated from the stem. Still if it contains few more prefixes in it, because there is a practice in Sanskrit that more than one prefix can be

used in a conjugation, prefixes are separated. The prefix is also translated and added to the verb, soon after identifying the root verb from the conjugation.

To improve the accuracy and feasibility in MT, instead of separating 'vahE' from token, *AvahE* is considered and separated (last vowel has been taken from stem and prefixed it to the affix 'vahE' to make it *AvahE*). If an active reflexive root verb is considered to derive to its first person, dual form, present tense, 'vahE' should be used as affix to the root verb.

Conjugation consists in forming the root verb undergo certain modifications. In addition to it of certain prefixes and terminations which denote the various persons, numbers, voices, tenses, and moods. Information such as tense (present, past or future), number (singular, dual or plural), person (first, second or third) and type of the verb (reflexive or transitive) and voice (active or passive) are fetched from the affix. Stem is used to find out the root verb. In majority of cases, stem is available in corrupted form. Root verbs of corrupted stems are identified with the help of the inverse procedure of the procedure that is used to form conjugations of a root verb (described in Table A3 of Appendix A). From the example, *SObh* is the stem in corrupted form (of root verb *Subh*). It is recognized as a corrupted form because it is not available in data base. Hence it is morphed to obtain its root verb using the grammar rules.

Since many of the root verbs are the synonyms of other root verbs, as described in the above section, 500 standard roots are considered for translation. Their conjugations are formulated and morphed to obtain their root forms back successfully in MT by developing a Morphological Analysis System (MAS). For instance, Six tenses and four moods (total ten *lakaras*) of two root verbs (one from *AtmanEpadi*, i.e. reflexive verb and another from *parasmaipadi*, i.e. transitive verb) are described in Table A4 of Appendix A.

CONCLUSION

Conjugations of active verbs are analyzed and identified their tense or mood. Root verb has also been identified from the conjugation by using morphological analysis based on the grammar rules of Sanskrit. Much focus has been given in identifying and extracting the root verb from the reduplicated conjugations in morphological analysis since the reduplicated part should be identified and removed properly from stem.

Though majority active verb conjugations are translated successfully using MT, a more powerful MAS is required to be implemented to increase the accuracy in translation as well as to translate various other categories of verbs, such as interrogative, negative, causative, etc.

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Appendix A

Table A1 Tenses and moods of Sanskrit

lakAra	Tense/ Mood	Sanskrit name	Remarks
laT	Present (T)	vartamAna kAla	
laG	Past imperfect (T)	Anadhyatana bhUtakAla	Takes augment
liT	1. Reduplicated Past perfect (T) 2. Periphrastic past perfect (T)	parOksha bhUta kAla	1. Reduplicated denotes absolutely past 2. Few verbs which are not allowed to form reduplicated perfect, they will be formed periphrastically with auxiliary verb
luG *	1. Past 1 st aorist (T) 2. Past 2 nd aorist (T)	bhUta kAla	Will be augmented
luT	First future (T)	anadhyatana bhavishyat kAla	Definite future.
lRT	Second future (T)	bhavishyat kAla	Though, indefinite future, in some situations, can be used as periphrastic future.
lOT	Imperative (M)	AgnA	
vidhiliG	Potential (M)	vidhi	Will be used to command, wish, inquiry, supposition, condition, relative dependency
ASrliG *	Benedictive (M)	ASIH	Not only used to bless, but also for general wish
lRG *	Conditional (M)	sankEtaH	Conditional – if things are spoken of that might have, but have not happened.

Legend: * Not in much use, T – Tense, M – Mood

Table A2 Affixes of active verbs

T	V	Third person			Second person			First person		
		Singular	Dual	Plural	Singular	Dual	Plural	Singular	Dual	Plural
लट्	A	ते	ेते	अन्ते	से	ेथे	ध्वे	े	ावहे	ामहे
	P	ति	त	अन्ति / न्ति	सि	थः	थ	मि	वः	मः
लङ्	A	अ + त	इताम् / आताम्	अ + न्त/ अत	अ + थाः	इथाम् / आथाम्	अ + ध्वम्.	अ + इ	वहि	अ + महि
	P	अ + त्/ द्	ताम्	अ + अन्/ उः / न्	अ + अः	तम्	अ + त	अ + म्/ अम्	व	अ + म
लिट्	A	आञ्चक्रे / ए	आते	आञ्चक्रिरे / इरे	आञ्चकृषे / इषे	आथे	आञ्चकृद्वे/ इध्वे/ इद्वे	आञ्चक्रे/ ए	इवहे	आञ्चकृमहे/ इमहे
	P	अ	तुः	उः	इथ / थ	थुः	अ	अ	व / इव	म / इम
लुङ्	A	अ + ष्ट/ स्त	साताम्	अ + षत / सत	अ + ष्टाः / थाः	साथाम्	अ + इवम्/ ध्वम्.	अ + पि / सि	सीवहि	अ + ष्महि
	P	अ + सीत/ ईत्/अत्/ त्	ताम्	अ + सुः/ इपुः/ अन्/ उः/ वन्	अ + सीः/ ईः/ अः	तम्	अ + स्त/ त इष्ट/ अत/ त	अ + सम्/ इषम्/ अम्	व / ाव	अ + स्म/ इष्म/ आम/ म
लृट्	A	ता	तारौ	तारः	तासे	तासाथे	ताध्वे	ताहे	तास्वहे	तास्महे
	P	ता	तारौ	तारः	तासि	तास्थः	तास्थ	तास्मि	तास्वः	तास्मः
लृट्	A	प्यते / स्यते	प्येते / स्येते	प्यन्ते / स्यन्ते	इप्यसे / स्यसे	प्येते / स्येते	प्यध्वे / स्यध्वे	प्ये / स्ये	प्यावहे / स्यावहे	प्यामहे / स्यामहे
	P	स्यति / प्यति	स्यतः / प्यतः	स्यन्ति / प्यन्ति	स्यसि / प्यसि	स्यथः/ प्यथः	स्यथ / प्यथ	स्यामि / प्यामि	स्यावः / प्यावः	प्यामः / स्यामः
लोट्	A	ताम्.	इताम् / आताम्	अताम्/ न्ताम्.	स्व	इथाम् / आथाम्	ध्वम्.	ऐ	आवहे	आमहे
	P	तु / तात्	तां	अन्तु / न्तु	हि/ धि/ आन	तं	त	आनि	आव	आम
बिभ्रि लिङ्	A	ईत	ईयाताम्	ईरन्	ईथाः	ईयाथाम्	ईध्वम्	ईय	ईवहि	ईमहि
	P	यात् / इत्	ईताम्	इयुः / युः	इः / याः	ईतम्	इत / यात	इयम् / याम्	ईव	इम / याम
आशीः लिङ्	A	सीष्ट / पीष्ट / इष्ट	सीयास्ताम् / इपाताम् / एताम् / आताम्	सीरन् / पीरन्/ इषत/ अन्त/ अत	सीष्ठाः / पीष्ठाः / इष्ठाः / अताः	सीयास्थाम् / इपाथाम् / एथाम् / आथाम्	पीध्वम्/ इध्वम्/ अध्वम्	पीय/ इषि/ ए/ इ	सीवहि / इष्वहि / आवहि	सीमहि / पीमहि/ इष्महि/ आमहि
	P	यात्	यास्ताम्	यासुः	याः	यास्तम्	यास्त	यासम्	यास्व	यास्म
लृङ्	A	अ + प्यत / स्यत	स्येताम्	अ + प्यन्त / स्यन्त	अ + इप्यथाः	स्येथाम्	अ + इप्यध्वम्	अ + इप्ये	स्यावहि	अ + इप्यामहि
	P	अ + स्यत् / प्यत्	स्यताम् / प्यताम्	अ + स्यन् / प्यन्.	अ + स्यः / प्यः	स्यतम् / प्यतम्	अ + स्यत / प्यत	अ + स्यम् / प्यम्.	स्याव / प्याव	अ + स्याम / प्याम

Legend: T – Tense, V – Verb, A – AtmanEpadi, P – parasmYpadi, अ + affix = अ is prefix, Numbers of gaNas are given in brackets



Table A3 Rules for forming conjugations from root verbs

S. N	gaNa	Suffix to root	Rules	Example	Remarks
1	bhU	a (अ)	Vowel of root is <i>Gunated</i> if 1. इ, ई, उ, ऊ, ऋ, or ॠ is final letter 2. इ, उ, ऋ, or ॠ is followed by a consonant	1. बुध् (to Know) => बोध्+अ+ति 2. भू (to be) => भव्+अ+ति	Accent is on radical vowel
2	tud	a (अ)	Before appending suffix, change final letters as below 1. इ, ई => इय् 2. उ, ऊ = उव् 3. ऋ => रिय् 4. ॠ => इर्	1. तुद् (to Strike) => तुद्+अ+ति 2. रि (to Go) => रिय्+अ+ति 3. नु (to Praise) => नुव्+अ+ति 4. मृ (to Die) => म्रिय्+अ+ ते 5. कृ (to Scatter) => किर्+अ+ति	Accent is on intermediate अ, but, never on radical vowel
3	div	ya (य)	-	1. नह् (to Bind) => नह्+य+ति 2. बुध् (to Awake) => बुध्+य+ते	Accent is on radical vowel. But in few cases of the class original accent will be on य
4	cur	aya (अय)	1. If root ends in simple consonant preceded by अ, it become आ 2. If root ends in simple consonant preceded by इ, उ ऋ, ॠ, takes Guna while ॠ becomes ईर् 3. final इ, ई, उ, ऊ, ऋ, or ॠ take vRddhi	1. दल् (to Cut) => दाल्+अय+ति 2a. क्षिष् (to Embrace) => शेल्ष्+अय+ति 2b. चूर् (to Steal) => चोर्+अय+ति 2c. मृष् (to Endure) => मर्ष्+अय+ते 2d. कृत् (to Praise) => कीर्त्+अय+ति 3a. ज्रि (to Grow ole) => ज्राय्+अय+ति 3b. मी (to Walk) => माय्+ अय+ति 3c. धृ (to Hold) => धार्+अय+ति 3d. पू (to Fill) => पार्+अय+ति	Accent was on first अ or अय . The verbs keep their modificatory syllable अय throughout except in Benedictive Par.
5	su	1. nu (नु - before strong terminations) 2. no (नो - before weak terminations)	-	1a. सु (to Squeeze out) => सु+नु+मः (1 st person Plu. Pre.), 1b. सु+नो+मि (1 st per. Sing. Pre.)	-
6	tan	1. u (उ - before strong terminations) 2. O (ओ - before weak terminations)	-	1a. तन्. (to Streach) => तन्+उ+मः (1 st person Plu. Pre.) 1b. तन्+ओ+मि (1 st per. Sing. Pre.)	All verbs end in न् in the class except कृ
7	kri	1. nI (नी - before strong terminations) 2. nA (ना - before weak terminations) 3. na (न - before strong terminations beginning with vowels)	-	1a. क्री (to Buy) => क्री+णी+मः (1 st person Plu. Pre.) 1b. क्री+णा+मि (1 st per. Sing. Pre.) 1c. क्री+ण्+अन्ति (3 rd per. Plu. Pre.)	-
8	ad	Terminations added immediately to the last letter of the base as per phonetic rules	-	1a. लिह्. (to Lick) लिह्+मः (we lick) 1b. ले+ह्मि (I lick) 1c. लेक्+पि (you lickest) 1d. ली+ह (you lick) 1e. अलेट् (thou lickedst)	Intensive verbs, conjugated in the <i>paramy pada</i> , follow this class
9	hu	Terminations added immediately to the last letter of the base as per phonetic rules	Strong base before the weak termination takes <i>guNa</i> , where possible	1a. हु (to Sacrifice) => जु+हु+मः (we sacrifice) 1b. जु+हो+मि (I sacrifice)	Root takes reduplication
10	rudh	Terminations added immediately to the last letter of the base as per phonetic rules	Between the radical vowel & final consonant, न् is inserted, which in the strong base before weak	1a. युज् (to Join) => यु+न्+ज्+मः (we join) 1b. यु+न+ज्मि (I join)	

S. N	gaNa	Suffix to root	Rules	Example	Remarks
			terminations are raised to न		

Legend: Sing – Singular, Plu – Plural, Pre - Present

Table A4 Example tenses and moods of *dhatus bhU* and *Subh* of *bhU gaNa*

T	V	Third person			Second person			First person		
		Singular	Dual	Plural	Singular	Dual	Plural	Singular	Dual	Plural
लट्	A	शोभते	शोभाते	शोभन्ते	शोभसे	शोभाथे	शोभध्वे	शोभे	शोभावहे	शोभामहे
	P	भवति	भवतः	भवन्ति	भवसि	भवथः	भवथ	भवमि	भवावः	भवामः
लङ्	A	अशोभेत	अशोभिताम्	अशोभन्त	अशोभताः	अशोभिताम्	अशोभध्वम्	अशोभे	अशोभावहि	अशोभामहि
	P	अभवत्	अभवताम्	अभवन्	अभवः	अभवतम्	अभवत	अभवम्	अभवाव	अभवाम
लिट्	A	शुशुभे	शुशुभाते	शुशुभिरे	शुशुभिशे	शुशुभाथे	शुशुभिध्वे	शुशुभे	शुशुभिवहे	शुशुभिमहे
	P	बभूव	बभूवतुः	बभूवुः	बभूवित्थ	बभूवथुः	बभूव	बभूव	बभूविव	बभूविवम
लुङ्	A	अशोभिष्ट	अशोभिषाताम्	अशोभिषत	अशोभिष्टाः	अशोभिषाथाम्	अशोभिध्वम्	अशोभिषिः	अशोभिष्वहि	अशोभिष्वमहि
	P	अभूत्	अभूताम्	अभूवन्	अभूः	अभूतम्	अभूत	अभूवम्	अभूव	अभूम
लृट्	A	शोभिता	शोभितारौ	शोभितारः	शोभितासे	शोभितासाथे	शोभिताध्वे	शोभिताहे	शोभितास्वहे	शोभितास्महे
	P	भविता	भवितारौ	भवितारः	भवितासि	भवितास्थः	भवितास्थ	भवितास्मि	भवितास्वः	भवितास्मः
लृट्	A	शोभिष्यते	शोभिष्येते	शोभिष्यन्ते	शोभिष्यसे	शोभिष्येथे	शोभिष्येध्वे	शोभिष्ये	शोभिष्यावहे	शोभिष्यामहे
	P	भविष्यति	भविष्यतः	भविष्यन्ति	भविष्यसि	भविष्यथः	भविष्यथ	भविष्यामि	भविष्यावः	भविष्यामः
लोट्	A	शोभताम्	शोभताम्	शोभन्ताम्	शोभस्व	शोभाथाम्	शोभध्वम्	शोभे	शोभावहे	शोभमहे
	P	भवतु / भवतात्	भवताम्	भवन्तु	भव / भवतात्	भवतम्	भवत	भवानि	भवाव	भवाम
विधि लिङ्	A	शोभेत	शोभेयाताम्	शोभेरन्	शोभेथाः	शोभेयाथाम्	शोभेध्वम्	शोभेय	शोभावहि	शोभामहि
	P	भवेत्	भवेताम्	भवेयुः	भवेः	भवेतम्	भवेत	भवेयम्	भवेव	भवेम
आशीः लिङ्	A	शोभिषीष्ट	शोभिषीयास्ताम्	शोभिषीरन्	शोभिषीष्टः	शोभिषीयास्थाम्	शोभिषीध्वम्	शोभिषीय	शोभिषीवहि	शोभिषीमहि
	P	भूयात्	भूयास्ताम्	भूयासुः	भूयाः	भूयास्तम्	भूयास्त	भूयासम्	भूयास्व	भूयास्म
लृङ्	A	अशोभिष्यत	अशोभिष्येताम्	अशोभिष्यन्त	अशोभिष्यथाः	अशोभिष्येथाम्	अशोभिष्यध्वम्	अशोभिष्ये	अशोभिष्यावहि	अशोभिष्यामहि
	P	अभविष्यत्	अभविष्यताम्	अभविष्यन्	अभविष्यः	अभविष्यतम्	अभविष्यत	अभविष्यम	अभविष्याव	अभविष्याम

Legend: T – Tense, V – Verb, A – *AtmanEpadi* (e.g. *Subh* - glow), P – *parasmYpadi* (e.g. *bhU* - be)

Table A5 *upasargas* (prefixes) of Sanskrit

S.No	Prefix	Meaning	Example	S.No	Prefix	Meaning	Example
1.	<i>ati</i>	Over, beyond	<i>atikram</i> (to surpass, overstep)	10.	<i>upa</i>	Near, under	<i>upagam</i> (to go near to)
2.	<i>adhi</i>	Above, on	<i>adhikR</i> (place over, appoint)	11.	<i>ni</i>	Down, into	<i>nigrah</i> (to suppress)
3.	<i>anu</i>	Along, near	<i>anukR</i> (to do after, imitate)	12.	<i>niH</i>	Out of, forth from	<i>nirgam</i> (to go out)
4.	<i>apa</i>	Away, off	<i>apagam</i> (to go away)	13.	<i>para</i>	Away, back	<i>parAvRt</i> (to turn away)
5.	<i>api</i>	Near to, on	<i>apigam</i> (to approach)	14.	<i>pari</i>	Round, about	<i>paribhram</i> (to roam)
6.	<i>abhi</i>	Towards, upon	<i>abhipat</i> (to fall upon)	15.	<i>pra</i>	Forth, forward	<i>prakram</i> (to proceed)
7.	<i>ava</i>	Off, down	<i>avacchidr</i> (to cut off)	16.	<i>prati</i>	Back, re-	<i>prativad</i> (to respond)
8.	<i>A</i>	Towards, at	<i>AkRsh</i> (to ttract)	17.	<i>vi</i>	Apart, dis-	<i>vidhA</i> (to dispose)
9.	<i>ud</i>	Up, out	<i>utsRj</i> (to pour out)	18.	<i>sam</i>	Together, con-	<i>samgam</i> (to assemble)