

ADDITIONAL DOCUMENT FOR TULU UNICODE PROPOSAL

Karnataka Tulu Sahitya Academy

Dr. Akash Raj Jain,

Syndicate Member, Karnataka Tulu Sahitya Academy, Mangalore

Technical Support

Nischith Golithady
Sharath Kumar Kodavoor
Kiran Tuluve

Sumanth Poojary Hebri
Jnanesh Deralakatte
Deepak Padukone

Font Support

Prahlad Prasad Tantry

26th October 2022

Contents

1. Introduction.....	2
2. Letters of the script	2
3. Ottakshara or Cluster:	14
4. Comparative size of Glyphs.....	16
5. Relationship of Tulu with Malayalam and Tigalari	16
6. Unique features of Tulu script	19
7. Clarifications on comments of Jan Kučera (L2/20-279).	20
8. Response to Review L2/22-023.....	36
9. Deviation of modern Tulu script from Historic Tulu script	38
10. Conclusion	39
11. REFERENCES:.....	42

1. Introduction

We are proposing this document to Unicode consortium, which is an additional document in continuation to previous proposed documents, put forward by Michael Everson (NH025, [L2/11120](#)) , by Karnataka Tulu Sahitya Academy (KTSA) ([L2/20-177](#)), by U.B. Pavanaja for Karnataka Tulu sahitya academy ([L2/21-019](#)), and by Dr. Akash Raj Jain, KTSA ([L2/21-213](#) and [L2/22-034](#)).

In this proposal, we have done the modifications based on the review feedback by script Ad-Hoc group of Unicode technical committee ([L2/21-073](#)), also we have attempted to answer questions raised by professor Jan Kučera ([L2/20-279](#)).

Kindly note that this is an improved document whereas, some minor changes may be seen in this document in comparison to previous documents.

The process of script standardization began in the year 2017, after all the research work and concluded script standardisation was done in 2021. In this proposal these updates are presented.

2. Letters of the script

A preliminary glyph chart for Tulu is presented in [Table 1](#) and character names are shown in [Table 2](#). An initial estimate indicates that the Tulu script will require a minimum of 88 code-points, consisting of:

- Vowels: 17 letters
- Vowel signs: 16 signs
- Yogavahas: 2 signs
- Consonants: 36 letters
- Virama: 1 sign
- Repha: 1 sign
- Special sign: 2
- Numbers: 12
- Length mark: 1

	xx00	xx01	xx02	xx03	xx04	xx05
0	ಅ	ಁ	ಂ	ಃ	಄	ಅ
1	ಆ	ಇ	ಈ	ಉ	ಊ	ಋ
2	ಋ	ೠ	ಌ	಍	ಎ	
3	ಏ	ಐ	ಓ	ಔ	಑	
4	ಒ	ಓ	ಔ	಑	ಒ	ಒ
5	ಒ	ಓ	ಔ	಑	ಒ	ಒ
6	ಒ	ಓ	ಔ	಑	ಒ	ಒ
7	ಒ	ಓ	ಔ	಑	ಒ	ಒ
8	ಒ	ಓ	ಔ	಑	ಒ	ಒ
9		ಒ	ಓ	ಔ	಑	ಒ
A	ಒ	ಓ	ಔ	಑	ಒ	ಒ
B	ಒ	ಓ	ಔ	಑	ಒ	ಒ
C	ಒ	ಓ	ಔ	಑	ಒ	ಒ
D	ಒ	ಓ	ಔ	಑	ಒ	ಒ
E	ಒ	ಓ	ಔ	಑	ಒ	ಒ
F	ಒ	ಓ	ಔ	಑	ಒ	ಒ

Table 1: Preliminary Glyph Chart for Tulu.

Preliminary Tulu Characters, Names and Properties

```

xx000: TULU LETTER A;Lo;0;L;;;;N;;;;;
xx001: TULU LETTER AA;Lo;0;L;;;;N;;;;;
xx002: TULU LETTER I;Lo;0;L;;;;N;;;;;
xx003: TULU LETTER II;Lo;0;L;;;;N;;;;;
xx004: TULU LETTER SPECIAL U;Lo;0;L;;;;N;;;;;
xx005: TULU LETTER U ;Lo;0;L;;;;N;;;;;
xx006: TULU LETTER UU ;Lo;0;L;;;;N;;;;;
xx007: TULU LETTER VOCALIC R ;Lo;0;L;;;;N;;;;;
xx008: TULU LETTER VOCALIC RR ;Lo;0;L;;;;N;;;;;
xx009: <<RESERVED>>
xx00A: TULU LETTER E ;Lo;0;L;;;;N;;;;;
xx00B: TULU LETTER EE ;Lo;0;L;;;;N;;;;;
xx00C: TULU LETTER SPECIAL E ;Lo;0;L;;;;N;;;;;
xx00D: TULU LETTER SPECIAL EE ;Lo;0;L;;;;N;;;;;
xx00E: TULU LETTER AI ;Lo;0;L;;;;N;;;;;
xx00F: TULU LETTER O ;Lo;0;L;;;;N;;;;;
xx010: TULU LETTER OO ;Lo;0;L;;;;N;;;;;
xx011: TULU LETTER AU ;Lo;0;L;;;;N;;;;;
xx012: TULU LETTER KA ;Lo;0;L;;;;N;;;;;
xx013: TULU LETTER KHA Lo;0;L;;;;N;;;;;
xx014: TULU LETTER GA ;Lo;0;L;;;;N;;;;;
xx015: TULU LETTER GHA ;Lo;0;L;;;;N;;;;;
xx016: TULU LETTER NGA ;Lo;0;L;;;;N;;;;;
xx017: TULU LETTER CA ;Lo;0;L;;;;N;;;;;
xx018: TULU LETTER CHA ;Lo;0;L;;;;N;;;;;
xx019: TULU LETTER JA ;Lo;0;L;;;;N;;;;;
xx01A: TULU LETTER JHA ;Lo;0;L;;;;N;;;;;
xx01B: TULU LETTER NYA ;Lo;0;L;;;;N;;;;;
xx01C: TULU LETTER TTA ;Lo;0;L;;;;N;;;;;
xx01D: TULU LETTER TTHA ;Lo;0;L;;;;N;;;;;
xx01E: TULU LETTER DDA ;Lo;0;L;;;;N;;;;;
xx01F: TULU LETTER DDHA ;Lo;0;L;;;;N;;;;;
xx020: TULU LETTER NNA ;Lo;0;L;;;;N;;;;;
xx021: TULU LETTER TA ;Lo;0;L;;;;N;;;;;
xx022: TULU LETTER THA ;Lo;0;L;;;;N;;;;;
xx023: TULU LETTER DA ;Lo;0;L;;;;N;;;;;
xx024: TULU LETTER DHA ;Lo;0;L;;;;N;;;;;
xx025: TULU LETTER NA ;Lo;0;L;;;;N;;;;;
xx026: TULU LETTER PA ;Lo;0;L;;;;N;;;;;
xx027: TULU LETTER PHA ;Lo;0;L;;;;N;;;;;
xx028: TULU LETTER BA ;Lo;0;L;;;;N;;;;;
xx029: TULU LETTER BHA ;Lo;0;L;;;;N;;;;;
xx02A: TULU LETTER MA Lo;0;L;;;;N;;;;;
xx02B: TULU LETTER YA ;Lo;0;L;;;;N;;;;;
xx02C: TULU LETTER RA ;Lo;0;L;;;;N;;;;;
xx02D: TULU LETTER RRA ;Lo;0;L;;;;N;;;;;
xx02E: TULU LETTER LA ;Lo;0;L;;;;N;;;;;
xx02F: TULU LETTER VA ;Lo;0;L;;;;N;;;;;
xx030: TULU LETTER SHA ;Lo;0;L;;;;N;;;;;
xx031: TULU LETTER SSA ;Lo;0;L;;;;N;;;;;
xx032: TULU LETTER SA ;Lo;0;L;;;;N;;;;;
xx033: TULU LETTER HA ;Lo;0;L;;;;N;;;;;
xx034: TULU LETTER LLA ;Lo;0;L;;;;N;;;;;
xx035: TULU LETTER LLLA ;Lo;0;L;;;;N;;;;;
xx036: <<RESERVED>>
xx037: <<RESERVED>>

```

```

xx038: TULU VOWEL SIGN AA ;Mc;0;L;;;;;N;;;;;
xx039: TULU VOWEL SIGN I ;Mc;0;L;;;;;N;;;;;
xx03A: TULU VOWEL SIGN II ;Mc;0;L;;;;;N;;;;;
xx03B: TULU VOWEL SIGN SPECIAL U ;Mn;0;NSM;;;;;N;;;;;
xx03C: TULU VOWEL SIGN U ;Mn;0;NSM;;;;;N;;;;;
xx03D: TULU VOWEL SIGN UU ;Mn;0;NSM;;;;;N;;;;;
xx03E: TULU VOWEL SIGN VOCALIC R ;Mn;0;NSM;;;;;N;;;;;
xx03F: TULU VOWEL SIGN VOCALIC RR ;Mn;0;NSM;;;;;N;;;;;
xx040: TULU VOWEL SIGN E ;Mc;0;L;;;;;N;;;;;
xx041: TULU VOWEL SIGN EE ;Mc;0;L;;;;;N;;;;;
xx042: TULU VOWEL SIGN SPECIAL E ;Mc;0;L;;;;;N;;;;;
xx043: TULU VOWEL SIGN SPECIAL EE ;Mc;0;L;;;;;N;;;;;
xx044: TULU VOWEL SIGN AI ;Mc;0;L;;;;;N;;;;;
xx045: TULU VOWEL SIGN O ;Mc;0;L;xx040 xx038;;;;;N;;;;;
xx046: TULU VOWEL SIGN OO ;Mc;0;L;xx04C XX038;;;;;N;;;;;
xx047: TULU VOWEL SIGN AU ;Mc;0;L;;;;;N;;;;;
xx048: TULU SIGN ANUSVARA ;Mc;0;L;;;;;N;;;;;
xx049: TULU SIGN VISARGA ;Mc;0;L;;;;;N;;;;;
xx04A: TULU SIGN VIRAMA ;Mn;9;NSM;;;;;N;;;;;
xx04B: TULU SIGN REPHA ;Mn;230;NSM;;;;;N;;;;;
xx04C: TULU SIGN OO LENGTH MARK;Mc;0;L;;;;;N;;;;;
xx04D: <<RESERVED>>
xx04E: <<RESERVED>>
xx04F: <<RESERVED>>
xx050: TULU SIGN SRII ;So;0;L;;;;;N;;;;;
xx051: TULU SIGN OM ;So;0;L;;;;;N;;;;;
xx052: <<RESERVED>>
xx053: <<RESERVED>>
xx054: TULU DIGIT ZERO; Nd;0;L;;0;0;0;N;;;;;
xx055: TULU DIGIT ONE ;Nd;0;L;;1;1;1;N;;;;;
xx056: TULU DIGIT TWO ;Nd;0;L;;2;2;2;N;;;;;
xx057: TULU DIGIT THREE Nd;0;L;;3;3;3;N;;;;;
xx058: TULU DIGIT FOUR ;Nd;0;L;;4;4;4;N;;;;;
xx059: TULU DIGIT FIVE ;Nd;0;L;;5;5;5;N;;;;;
xx05A: TULU DIGIT SIX ;Nd;0;L;;6;6;6;N;;;;;
xx05B: TULU DIGIT SEVEN ;Nd;0;L;;7;7;7;N;;;;;
xx05C: TULU DIGIT EIGHT ;Nd;0;L;;8;8;8;N;;;;;
xx05D: TULU DIGIT NINE ;Nd;0;L;;9;9;9;N;;;;;
xx05E: TULU NUMBER TEN ;No;0;L;;;10;N;;;;;
xx05F: TULU NUMBER HUNDRED; No;0;L;;;100;N;;;;;

```

Table 2A: Preliminary Tulu Characters, Names and Properties

a. Vowel signs to the right	ಾ, ೀ, ು, ೂ
b. Vowel sign above and below	ೠ
c. Vowel signs below and ligating to the right	ೡ, ೢ, ೣ, ೤
d. Vowel signs to the left	ೞ, ೟, ೠ, ೡ, ೢ
e. Vowel sign two-part	ೞೠ, ೟ೠ

Table 2B: Vowel signs grouped into 5 different types

- Proposed character inventory has covered nearly all sounds used by majority Tulu speakers in day-to-day conversations. However, a discussion is underway among scholar community about additional sounds used by a significant percentage of Tulu population. In order to accommodate characters representing these sounds, which are yet unaccounted in the above tabulation, Tulu should be allocated 96 code-points.

The 17 independent vowels which occur in word formations are as follows:

TULU VOWLES SWARAS - SET OF 17		
Sl. No.	DESCRIPTION	EQUIVALENT TULU VOWELS- INDEPENDENT SCRIPTS
1.	TULU LETTER: <i>a</i>	ಅ
2.	TULU LETTER: <i>ā</i>	ಆ
3.	TULU LETTER: <i>i</i>	ಇ
4.	TULU LETTER: <i>ī</i>	ಐ
5.	TULU LETTER: <i>u</i>	ಉ
6.	TULU LETTER: <i>ū</i>	ಊ
7.	TULU LETTER (vocalic): <i>r</i>	ಋ
8.	TULU LETTER (vocalic): <i>ṛ</i>	ೠ
9.	TULU LETTER: <i>e</i>	ಎ
10.	TULU LETTER: <i>ē</i>	ಏ
11.	TULU LETTER: <i>è</i>	ಐ
12.	TULU LETTER: <i>é</i>	ಒ
13.	TULU LETTER: <i>ai</i>	ಋ
14.	TULU LETTER: <i>o</i>	ಋ
15.	TULU LETTER: <i>ō</i>	ಋ
16.	TULU LETTER: <i>au</i>	ಋ

Table 3. Independent Tulu Vowels

- The 16 vowel signs which co-occur with other alphabets are as follows

TULU DEPENDENT VOWEL SIGNS MATRAS – SET OF 16		
Sl. No.	DESCRIPTION	EQUIVALENT MARKERS OF VOWELS FOR COMBINING WITH CONSONANTS/CONSONANT CLUSTERS – MATRAS – DEPENDENT STRUCTURES
1.	TULU VOWEL SIGN: <i>ā</i>	◌ᳵ
2.	TULU VOWEL SIGN: <i>i</i>	◌ᳶ
3.	TULU VOWEL SIGN: <i>ī</i>	◌᳷
4.	TULU VOWEL SIGN: <i>u</i>	◌᳸
5.	TULU VOWEL SIGN: <i>u</i>	◌᳹
6.	TULU VOWEL SIGN: <i>ū</i>	◌ᳺ
7.	TULU VOWEL SIGN (vocalic): <i>ṛ</i>	◌᳻
8.	TULU VOWEL SIGN (vocalic): <i>ṝ</i>	◌᳼
9.	TULU VOWEL SIGN: <i>e</i>	◌᳽
10.	TULU VOWEL SIGN: <i>ē</i>	◌᳾
11.	TULU VOWEL SIGN: <i>è</i>	◌᳿
12.	TULU VOWEL SIGN: <i>é</i>	◌ᳺ
13.	TULU VOWEL SIGN: <i>ai</i>	◌᳽ᳵ
14.	TULU VOWEL SIGN: <i>o</i>	◌᳽ᳶ
15.	TULU VOWEL SIGN: <i>ō</i>	◌᳽᳷
16.	TULU VOWEL SIGN: <i>au</i>	◌᳽᳸

Table 4. Dependent Tulu Vowel Signs

These dependent vowel signs, are majorly used to replace the inherent -a sound in Tulu consonants to arrive at other sounds in tune with pronunciation needs of various words. They are positioned at various locations alongside the consonants. The shape of the base character, however, remains the same with the addition of any of the above vowel signs. The signs 1-3 and 16 occur to the right of the base, 4 is attached in a combined form both above and below, 5-8 are attached below and ligate to the right, 9-13 cling to the left of the base and finally 14-15 co-occur in two parts, both to the left and right of the base.

- The *anusvāra* and *visarga* do not fall under the categorisation of either consonant or vowel. But owing to their linguistic and phonetic features, are termed as part vowels because of their typical usage to mark sounds. While the *anusvāra* has a nasal feature (- *am*), the *visarga* carries the voiceless glottal fricative sound.

TULU PART VOWELS YOGAVAHAS – SET OF 02		
Sl. N	DESCRIPTION	EQUIVALENT TULU SIGN
1.	TULU VOWEL SIGN: <i>am</i> - anusvara	◌ᳵ
2.	TULU VOWEL SIGN: <i>ah</i> - visarga	◌ᳶ

Table 5. Tulu Part Vowels

- The 36 consonants identified in Tulu language are essentially categorised into *vargeeyas* and *avargeeyas*, in tune with the structural identifications of other established scripts of various Indian languages. The first 25 consonants are known as *vargeeyas* which are marked and established based on the oral structural patterns with specific focus on tongue position during pronunciations, while the remaining 11 alphabets are termed as *avargeeya vyanjanas* which are a set of unstructured characters.

The entire consonant set consisting of both the *vargeeyas* (1-25) and *avargeeyas* (26-36) are listed below:

TULU CONSONANTS VYANJANAS – SET OF 36		
Sl. No.	DESCRIPTION	EQUIVALENT TULU ALPHABETS
1.	TULU LETTER: <i>ka</i>	ಕ
2.	TULU LETTER: <i>kha</i>	ಖ
3.	TULU LETTER: <i>ga</i>	ಗ
4.	TULU LETTER: <i>gha</i>	ಘ
5.	TULU LETTER: <i>ṅa</i>	ಙ
6.	TULU LETTER: <i>ca</i>	ಚ
7.	TULU LETTER: <i>cha</i>	ಛ
8.	TULU LETTER (vocalic): <i>ja</i>	ಜ
9.	TULU LETTER (vocalic): <i>jha</i>	ಝ
10.	TULU LETTER: <i>ṇa</i>	ಞ
11.	TULU LETTER: <i>ṭa</i>	ಟ
12.	TULU LETTER: <i>ṭha</i>	ಠ
13.	TULU LETTER: <i>ḍa</i>	ಡ
14.	TULU LETTER: <i>ḍha</i>	ಢ

15.	TULU LETTER: <i>ṇa</i>	ṇ
16.	TULU LETTER: <i>ta</i>	ṭ
17.	TULU LETTER: <i>tha</i>	ṭṭ
18.	TULU LETTER: <i>da</i>	ḍ
19.	TULU LETTER: <i>dha</i>	ḍḍ
20.	TULU LETTER: <i>na</i>	ṇ
21.	TULU LETTER: <i>pa</i>	ṇṇ
22.	TULU LETTER: <i>pha</i>	ṇṇṇ
23.	TULU LETTER: <i>ba</i>	ḅ
24.	TULU LETTER: <i>bha</i>	ḅḅ
25.	TULU LETTER: <i>ma</i>	ṁ
26.	TULU LETTER: <i>ya</i>	ṁṁ
27.	TULU LETTER: <i>ra</i>	ṁṁṁ
28.	TULU LETTER: <i>ṛa</i>	ṁṁṁṁ
29.	TULU LETTER: <i>la</i>	ṁṁṁṁṁ
30.	TULU LETTER: <i>va</i>	ṁṁṁṁṁṁ
31.	TULU LETTER: <i>śa</i>	ṁṁṁṁṁṁṁ
32.	TULU LETTER: <i>ṣa</i>	ṁṁṁṁṁṁṁṁ
33.	TULU LETTER: <i>sa</i>	ṁṁṁṁṁṁṁṁṁ
34.	TULU LETTER: <i>ha</i>	ṁṁṁṁṁṁṁṁṁṁ
35.	TULU LETTER: <i>ḷa</i>	ṁṁṁṁṁṁṁṁṁṁṁ
36.	TULU LETTER: <i>ḻa</i>	ṁṁṁṁṁṁṁṁṁṁṁṁ

Table 6. Tulu Consonants

- The *Virama* character is used in combination with consonants to disable the inherent vowel -*a* sound in Tulu. The encoding techniques for Indic scripts which depend on Indian Script Code for Information Interchange (ISCII) model facilitate the integration of *Virama* features.

TULU MARKER TO DISABLE THE ‘a’ FROM CONSONANTS | VIRAMA – SET OF 01

Sl. No.	DESCRIPTION	EQUIVALENT TULU SIGN
1.	TULU VIRAMA SIGN:	ṁ

Table 7. Tulu Virama

- | TULU MARK REPHA – SET OF 01 | | |
|-----------------------------|------------------|---|
| Sl. No. | DESCRIPTION | EQUIVALENT TULU SIGN |
| 1. | TULU REPHA SIGN: |  |

STRUCTURAL SET OF REPHA COMBINATION:

[illegible]

- | TULU SYMBOLS OM AND SHRI - SET OF 02 | | |
|--------------------------------------|-----------------|----------------------|
| Sl. No. | DESCRIPTION | EQUIVALENT TULU SIGN |
| 1. | TULU SIGN OM: | ॐ |
| 2. | TULU SIGN SHRI: | ಶ್ರೀ |

Table 9. Tulu symbols *ōṃ* and *shri*

Therefore, the 12 essential characters to convey numerical forms for all necessary combinations are as follows:

Table 10. Tulu Digits and Numerals

The vowel signs do not alter the existing shape of the consonants or consonant clusters upon attachment and thus the shapes remain identifiably distinctive, unlike other Indian languages. The following sub-sections showcase the representation of 36 consonant sets when attached to various vowel signs as stated above in [Table 4](#).

[illegible]

[illegible]

සී>> චී>> ගී>> ඛී>> ඹී>> ධී>> ට්ඵී>> ට්ඹී>> ට්ඹ්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>>
 ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>>
 ට්ඵී>> ට්ඵී>> ට්ඵී>> ට්ඵී>>

[illegible]

ထွ> ချ> ဟူ> ဖျ> စေ့> သူ>သရဲ> ပေရဲ>မေ့> ကြာ> နှ> ဝှ> လှ> လှေ> တော> ကွ>
မြ> ဝှ> ယှ> ကွ> ပု> မေ့> ရာ> နှ> ဆှ> ရှ> ဗှ> ဗှ> လှ> ဂှ> ဂှ> ဖှ> ဖှ>
ကွ>>စွ>>ဇှ

၎>> ချ>> ငှ>> ဖြ>> ခွေ>> ပျ>> ပခွ>> ပေခွ>> ခေခွ>> ဟွေ>> န>> ဝှ>> ညှ>> ညှေ>> ဂျေ>> ဇှ>>
 နှ>> ဝှ>> ပျ>> ဂျ>> ပခွ>> ပေ>> ဟှ>> ခွ>> ခွ>> ဇှ>> ဇှ>> ဝှ>>
 ဇှ>> ဂျ>> ချ>> ဂျ>> ခွ>> ဇှ>>

[illegible]

$$\circ + \circ = \circ \mid \text{ਫ} + \circ = \text{ਫ਼}$$

9. STRUCTURAL SET OF CONSONANT AND VOWEL SIGN [ɣ̥] COMBINATION:

$$\textcircled{0} + 9\textcircled{0} = 9\textcircled{0} \quad | \quad \textcircled{9} + 9\textcircled{0} = 9\textcircled{9}$$
$$\textcircled{\cdot} + 9\textcircled{\cdot} = 9\textcircled{\cdot} \quad | \quad \textcircled{\cdot} + 9\textcircled{\cdot} = 9\textcircled{\cdot}$$
$$\circ + \textcircled{\circ} = \textcircled{\circ} \quad | \quad \textcircled{\circ} + \textcircled{\circ} = \textcircled{\circ}$$
$$\circ + \partial \circ = \partial \circ \quad | \quad \partial + \partial \circ = \partial \partial$$
$$\bigcirc + 99\bigcirc = 99\bigcirc \quad | \quad \text{ଘ} + 99\bigcirc = 99\text{ଘ}$$

၁၁၁>> ၁၁၂>> ၁၁၃>> ၁၁၄>> ၁၁၅>> ၁၁၆>> ၁၁၇>> ၁၁၈>> ၁၁၉>> ၁၁၁၀>>
၁၁၁၁>> ၁၁၁၂>> ၁၁၁၃>> ၁၁၁၄>> ၁၁၁၅>> ၁၁၁၆>> ၁၁၁၇>> ၁၁၁၈>> ၁၁၁၉>> ၁၁၁၁၀>>
၁၁၁၁၁>> ၁၁၁၁၂>> ၁၁၁၁၃>> ၁၁၁၁၄>> ၁၁၁၁၅>> ၁၁၁၁၆>> ၁၁၁၁၇>> ၁၁၁၁၈>> ၁၁၁၁၉>> ၁၁၁၁၁၀>>

၁၈၁>> ၁၉၁>> ၁၀၁>> ၁၂၁>> ၁၆၁>> ၁၃၁>> ၁၇၁>> ၁၈၁>> ၁၉၁>> ၁၀၁>> ၁၂၁>>
၁၆၁>> ၁၇၁>> ၁၈၁>> ၁၉၁>> ၁၀၁>> ၁၂၁>> ၁၆၁>> ၁၇၁>> ၁၈၁>> ၁၉၁>> ၁၀၁>> ၁၂၁>>
၁၆၁>> ၁၇၁>> ၁၈၁>> ၁၉၁>> ၁၀၁>> ၁၂၁>> ၁၆၁>> ၁၇၁>> ၁၈၁>> ၁၉၁>> ၁၀၁>> ၁၂၁>>

[illegible]

ಡ>> ಒ>> ೀ>> ು>> ೂ>> ಒ>> ಒ>> ೃ>> ಡ>> ೄ>> ಂ>> ೅>>
 ೆ>> ೇ>> ೈ>> ೉>> ೊ>> ೋ>> ೌ>> ್>> ೎>> ೏>> ೐>> ೑>> ೒>>
 ೓>> ೔>> ೕ>> ೖ>> ೗>> ೘>> ೙>> ೚>> ೛>> ೜>> ೝ>> ೞ>> ೟>> ೠ>> ೡ>> ೢ>> ೣ>> ೤>> ೥>> ೦>> ೧>> ೨>> ೩>> ೪>> ೫>> ೬>> ೭>> ೮>> ೯>> ೰>> ೱ>> ೲ>> ೳ>> ೴>> ೵>> ೶>> ೷>> ೸>> ೹>> ೺>> ೻>> ೼>> ೽>> ೾>> ೿>>

All these vowel signs can be grouped into 5 different types, i.e.,

a. vowel signs to the right	◌ᠠ, ᠡ, ᠢ, ᠣ
b. vowel sign above and below	◌ᠥ
c. vowel signs below and ligating to the right	◌ᠦ, ᠦᠭ, ᠦᠨ, ᠦᠭᠦ
d. vowel signs to the left	ᠠᠤ, ᠡᠤ, ᠢᠤ, ᠣᠤ, ᠠᠭᠤ
e. two-part vowel signs	ᠠᠠ, ᠡᠡ

Table 11. Grouping of vowel signs

3. Ottakshara or Cluster:

Apart from suppressing the inherent word final *-a* sound, the Virama leads to the implementation and formation of consonant clusters or *samyukthaksharas*. This is very common in Indic scripts and Tulu language too has good number of usages in word structures.

The clusters are made by combination of consonants and are with or without vowel signs at the end. The addition of the control character or the *virama* leads to the deletion of final *-a* sound from the first consonant. This is followed up by joining of the required consonant which ultimately forms the *samyukthaksharas*.

In case of need for attaching a vowel sign to the finalized consonant cluster, the same is added post the script as per the usual rendering methods of vowel addition (left, right, above and below, below and ligating to the right and two-part symbols to the base consonant cluster).

The below [table 12](#) and [table 13](#) give a general overview of how the shaping of *samyukthaksharas* take place both with and without vowel signs.

<i>samyukthaksharas</i> WITHOUT VOWEL POSITIONINGS				
ಏ	ಏ	ಏ	ಏ	ಏ
ಏ	ಏ	ಏ	ಏ	ಏ
ಏ	ಏ	ಏ	ಏ	ಏ
ಏ	ಏ	ಏ	ಏ	ಏ
ಏ	ಏ	ಏ	ಏ	ಏ
ಏ	ಏ	ಏ	ಏ	ಏ
ಏ	ಏ	ಏ	ಏ	ಏ

Table 12. Functioning of Samyukthaksharas without vowel signs

(Note: ಏ and ಏ are not used as compounds and hence they are omitted in the above table)

CONSONANTS		POST <i>samyukthaksharas</i> VOWEL POSITIONINGS				
I	II	LEFT -e (ಏ)	RIGHT -i (ಏ)	BELOW & LIGATING TO RIGHT -r (ಏ)	ABOVE & BELOW - u (ಏ)	TWO- PART - ō (ಏ)
ಏ	ಏ	ಏ	ಏ	ಏ	ಏ	ಏ
ಏ	ಏ	ಏ	ಏ	ಏ	ಏ	ಏ
ಏ	ಏ	ಏ	ಏ	ಏ	ಏ	ಏ
ಏ	ಏ	ಏ	ಏ	ಏ	ಏ	ಏ
ಏ	ಏ	ಏ	ಏ	ಏ	ಏ	ಏ

Table 13. Functioning of Samyukthaksharas with vowel signs

4. Comparative size of Glyphs

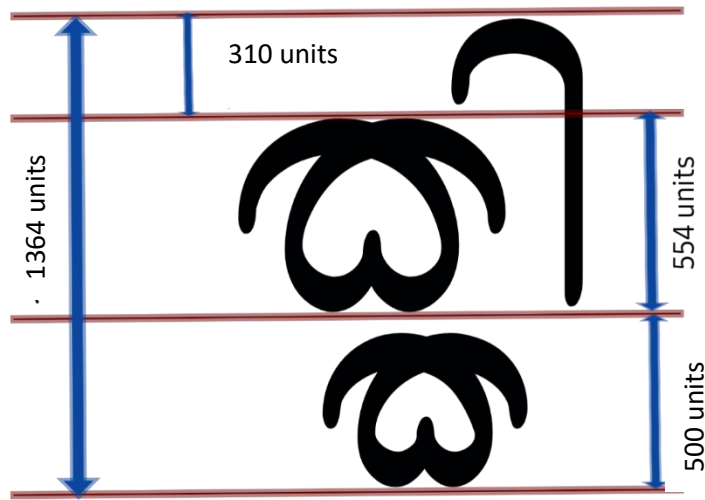


Fig.1 Glyph size comparison

The Fig.1 shows the comparative size of vattu and vowel sign for the cluster 'KKI'.

5. Relationship of Tulu with Malayalam and Tigalari

[Table 14A](#) shows the key differences between Tulu, Tigalari and Malayalam scripts.

Letter	Tulu	Tigalari	Malayalam
a	അ	അ	അ
ā	ആ	ആ	ആ
i	ഇ	ഇ	ഇ
ī	ഈ	ഈ	ഈ
u	ഉ	ഉ	ഉ
ū	ഊ	ഊ	ഊ
r	റ	റ	റ
ṛ	ഠ	ഠ	ഠ
e	എ	എ	എ

ē	ಛ	-	ಞ
è	ಞ	-	-
é	ಞ	-	-
ai	ಞ	ಞ	ಞ
o	ಞ	-	ಞ
ō	ಞ	ಞ	ಞ
au	ಞ	ಞ	ಞ
ka	ಞ	ಞ	ಞ
kha	ಞ	ಞ	ಞ
ga	ಞ	ಞ	ಞ
gha	ಞ	ಞ	ಞ
ña	ಞ	ಞ	ಞ
ca	ಞ	ಞ	ಞ
cha	ಞ	ಞ	ಞ
ja	ಞ	ಞ	ಞ
jha	ಞ	ಞ	ಞ
ña	ಞ	ಞ	ಞ
ṭa	ಞ	ಞ	ಞ
ṭha	ಞ	ಞ	ಞ
ḍa	ಞ	ಞ	ಞ
ḍha	ಞ	ಞ	ಞ
ṇa	ಞ	ಞ	ಞ
ta	ಞ	ಞ	ಞ
tha	ಞ	ಞ	ಞ
da	ಞ	ಞ	ಞ
dha	ಞ	ಞ	ಞ
na	ಞ	ಞ	ಞ

pa	പ	പ	പ
pha	ഫ	ഫ	ഫ
ba	ബ	ബ	ബ
bha	ബ	ബ	ഭ
ma	മ	മ	മ
ya	യ	യ	യ
ra	ര	ര	ര
la	ല	ല	ല
va	വ	വ	വ
śa	ശ	ശ	ശ
ṣa	ഷ	ഷ	ഷ
sa	സ	സ	സ
ha	ഹ	ഹ	ഹ
ḷa	ള	ള	ള

Table 14A: Comparison between Tulu, Tigalari (Source: “Alivinanchinalliruva Tigalari lipi hasthaprathigalu” by Dr. Keladi Gunda Joisa) and Malayalam

Numbers	Tulu	Tigalari	Malayalam
0	൦	൦	൦
1	൧	൧	൧
2	൨	൨	൨
3	൩	൩	൩
4	൪	൪	൪
5	൫	൫	൫
6	൬	൬	൬
7	൭	൭	൭
8	൮	൮	൮
9	൯	൯	൯
10	൧൦	൧൦	൧൦
100	൧൦൦	൧൦൦	൧൦൦

Table 14B: Tulu Numbers comparison between Tulu, Tigalari and Malayalam.

6. Unique features of Tulu script

6.1 Symbols

- The sacred/honorary-decorative sign, Shri: ශ್ರೀ. A unique honorary-decorative symbol used in invocations of manuscripts, divine references and while referring to the names of noble beings.



Fig2.Shri usage in Temple's Sign Boards

- Tulu number 10, ೧೦: This symbol is unique to Tulu script, often found in manuscripts representing the number ten.
- Tulu number 100, ೧೦೦: This symbol is unique to Tulu script, often found in manuscripts representing the number hundred.

6.2 Vowels

- The vowel sign for half u (u): ು. A special vowel in Tulu, mostly found at the ending of the words and in between. Unlike other Dravidian languages this sound also appears at the beginning in Tulu language.
- The vowel sign for special e (è): ೇ. Predominantly used with first person singular verbs. This sound also changes the meaning of the word if replaced with normal e (e) sound. This sound is hardly found in other Dravidian languages.
- The vowel sign for special ē (é): ೈ. Mostly found in the beginning of the words in both independent and dependent form. This sound is hardly found in other Dravidian languages.

7. Clarifications on comments of Jan Kučera ([L2/20-279](#)).

7.1. Script Name

Kindly note that Karnataka Tulu Sahitya Academy (KTSA) was established in the year 1994.

In a meeting held in 2007 it was decided to standardize Tulu script congruous to modern Tulu, which had a lot of variations in hand written and archaic forms.

It was decided to make it simpler, but to retain the basic glyphs of the script, complex compounding was less entertained and usage of stacking was preferred to represent such letters by Tulu linguists and scholars. This document consists of most recent changes adopted by KTSA in accordance to current Tulu language.

7.2. Character Set

Updated Tulu proposal has 88 characters and all of these are mentioned in [Table 1](#). Please note that there might be requirements for additional code points for Tulu and so few code points needs to be reserved.

7.3. Character Appearance

The comparison in Letters (character) appearance between Tulu, Tigalari and Malayalam is shown in [Table 14A](#) & the differences are highlighted.

The differences in digits/numbering system between Tulu, Tigalari (follows Kannada digits/numbers) and Malayalam is shown in [Table 14B](#)

7.4. Layout Features

Stacking:

Comparative size of stacking behaviour of characters is shown in [Fig 1](#). In order to avoid confusions while printing, we prefer to have relatively larger stacked character than which was proposed earlier.

The handwritten evidence for stacking behaviour is shown in the Fig 3.

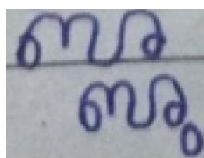


Fig.3 Handwritten evidence for stacking behaviour

Conjuncts:

Tulu will not use any special conjuncts. Letter **tu** in the previous proposal is been updated as (ತು)

Repha:

Tulu uses a Repha form that is placed above the base consonant to represent R-initial clusters. It is denoted by a short vertical line that is placed above the base letter.

7.5. Character names

Thanks to Professor Jan Kučera on these valuable feedbacks and we have followed the same wherever found necessary.

7.6. Collation

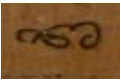
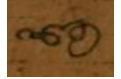
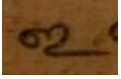
Collation model for Tulu is as shown below

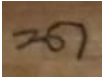
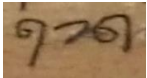
ANUSVARA < VISARGA < A < AA < I < II < Spcl U < U < UU < Voc R < Voc RR < E < EE < Spcl E < Spcl EE < AI < < O < OO < AU < VIRAMA < V.S. AA < V.S. I < VS. II < V.S. Spcl U < V.S. U < V.S. UU < V.S. Voc R < V.S. Voc RR < V.S. E < V.S. EE < V.S. Spcl E < V.S. Spcl EE < V.S. AI < V.S. O < V.S. OO < V.S. OO Length Mark < V.S. AU < KA < KHA < GA < GHA < NGA < CA < CHA < JA < JHA < NYA < TTA < TTHA < DDA < DDHA < NNA < TA < THA < DA < DHA < NA < PA < PHA < BA < BHA < MA < YA < RA < RRA < REPHA < LA < VA < SHA < SSA < SA < HA < LLA < LLLA

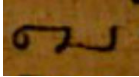
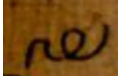
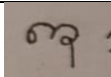
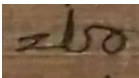
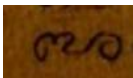
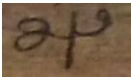
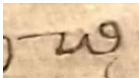
7.7. Evidence**❖ Historical Evidence:**

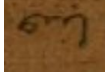
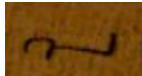
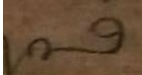
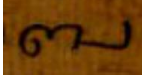
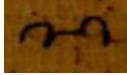
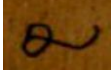
Historical evidences for Tulu characters and numerals extracted from manuscripts such as “Tulu Mahabharatho (14th century)”, “Tulu Ramayana (17th century)” & stone inscriptions (7th to 14th century) are shown in below [Table 16](#)

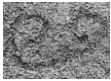
Since Tulu vowel signs ʌ (UA), e(E), è (AE), é(AEE), o(O) are introduced in accordance to Modern Tulu, the historical evidences are not mentioned in the chart.

IAST	Historic	Hand written	Allige Font	Historic Reference
Tulu Letter a			ᳵ᳚	Tulu Ramayana
Tulu Letter ā			ᳵ᳛	Tulu Ramayana
Tulu Letter i			ᳶ	Tulu Ramayana
Tulu Letter ī			ᳶ᳚	Bhagavad Geeta

Tulu Letter ʏ	N/A			
Tulu Letter u		೨	೨	Tulu Ramayana
Tulu Letter ū		೨	೨	Bhagavad Geeta
Tulu Letter ɾ		ಘ	ಘ	Tulu Ramayana
Tulu Letter ɿ			ಘ	Gaurishankar Ojha
Tulu Letter e	N/A			
Tulu Letter ē		೨	೨	Bhagavad Geeta
Tulu Letter è	N/A			
Tulu Letter é	N/A			
Tulu Letter ai	 1	೨೨	೨೨	Bhagavad Geeta
Tulu Letter o	N/A			
Tulu Letter ō		ಘ	ಘ	Vedantasara Prakarana
Tulu Letter au			ಘ	Gaurishankar Ojha
Tulu Letter am̐				
Tulu Letter aḥ				
Tulu Letter ka		ಕ	ಕ	Tulu Ramayana

Tulu Letter kha			ಖ	Vedantasara Prakarana
Tulu Letter ga			ಗ	Vedantasara Prakarana
Tulu Letter gha			ಘ	Vedantasara Prakarana
Tulu Letter ña			ಞ	Gaurishankar Ojha
Tulu Letter ca			ಚ	Tulu Ramayana
Tulu Letter cha			ಚಾ	Bhagavad Geeta
Tulu Letter ja			ಜಾ	Vedantasara Prakarana
Tulu Letter jha			ಜಃ	Bhagavad Geeta
Tulu Letter ña			ಞ	Gaurishankar Ojha
Tulu Letter ṭa			ಠ	Tulu Ramayana
Tulu Letter ṭha			ಠ	Vināyakahavana vidhi
Tulu Letter ḍa			ಢ	Tulu Ramayana
Tulu Letter ḍha			ಢಃ	Bhagavad Geeta

Tulu Letter ṇa			ṇ	Tulu Ramayana
Tulu Letter ta			ṭ	Vedantasara Prakarana
Tulu Letter tha			ṭṭ	Vedantasara Prakarana
Tulu Letter da			ḍ	Vedantasara Prakarana
Tulu Letter dha			ḍḍ	Vedantasara Prakarana
Tulu Letter na			ṇ	Vedantasara Prakarana
Tulu Letter pa			ṇṇ	Vedantasara Prakarana
Tulu Letter pha			ṇṇṇ	Bhagavad Geeta
Tulu Letter ba			ḷ	Vedantasara Prakarana
Tulu Letter bha			ḷḷ	Vedantasara Prakarana
Tulu Letter ma			ṁ	Vedantasara Prakarana
Tulu Letter ya			ṁṁ	Vedantasara Prakarana

Tulu Letter ra			ರ	Vedantasara Prakarana
Tulu Letter ṛa	N/A			
Tulu Letter la			ಲ	Vedantasara Prakarana
Tulu Letter va			ವ	
Tulu Letter śa			ಸ	Tulu Ramayana
Tulu Letter ṣa			ಷ	Vedantasara Prakarana
Tulu Letter sa			ಶ	Tulu Ramayana
Tulu Letter ha			ಹ	Vedantasara Prakarana
Tulu Letter ḷa			ಱ	Tulu Ramayana
Tulu Letter ḻa			ಱ	Maḷali inscription, Dakshina Kannada district
Tulu Number 1			೧	Private Collection
Tulu Number 2			೨	Private Collection
Tulu Number 3			೩	Private Collection

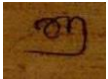
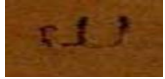
Tulu Number 4			೪	Private Collection
Tulu Number 5			೫	Private Collection
Tulu Number 6			೬	Private Collection
Tulu Number 7			೭	Private Collection
Tulu Number 8			೮	Private Collection
Tulu Number 9			೯	Private Collection
Tulu Number 10			೧೦	Private Collection

Table 16: Historical evidences for Tulu characters and numerals

Newly added vowels in Tulu script

ಫ (UA), ಎ(E), ಏ (AE), ಏ(AEE), ಓ(O) are the newly introduced vowels and their examples are shown in the below table.

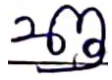
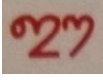
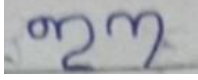
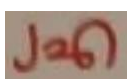
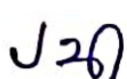
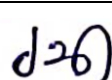
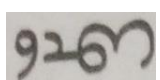
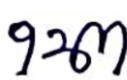
Vowel	Usage	Transliteration	Meaning
ಫ	ಫಲ	ಫಲೆ	The earth
	ಫುಡು	badukū	Life
ಏ	ಏಣ	ēṇu	who
	ಏಣ	kēṇu	ask
ಏ	ಏಣ್ಣ	èkkatè	hiccups
	ಏಣ	kurè	stain
ಏ	ಏಣ	bénè	pain
	ಏಣ	émè	Tortoise

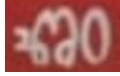
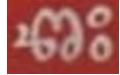
ಇ	ಓಲ	ōlu	where
	ಮಾಣ	mōnè	face

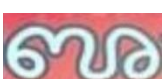
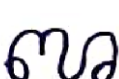
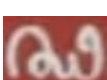
Table 17: Examples for newly added vowels in Tulu script

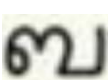
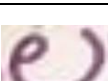
❖ **Printed and Handwritten Evidence:**

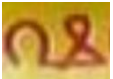
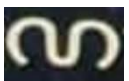
Recently many literatures have been published in Tulu script. Printed evidences taken from publications such as “Tulu Purpa”, “Piñgārada bāle siri page no 146-164 ([TA-ATT-03/05/2021](#))”, “[Tuluvaani](#) (web news)”, “[Tulunadu Varthe](#) (Weekly Newspaper)”, [Times of Kudla](#)(Weekly Newspaper) are shown here with in [Table 18](#). Kindly note the handwritten evidences provided which are drawn out from various sources such as School Examination Answer papers, painted sign boards, individual signatures & vouchers by traders.

IAST	Printed	Referred Source (Printed) / date	Handwritten	Referred Source (Handwritten)
Tulu Letter a		Fig. 7 in document L2/21-188 / Feb, 2021		Fig. 23 in document L2/21-188
Tulu Letter ā		Fig. 61 in document L2/21-188 / Feb, 2021		Tulu Script exam answer sheet
Tulu Letter i		Fig. 72 in document L2/21-188 / Mar, 2020		Tulu Script exam answer sheet
Tulu Letter ī		Tulu Purpa book / Aug, 2022		Tulu Script exam answer sheet
Tulu Letter u		Tulu Purpa book / Aug, 2022		Tulu Script exam answer sheet
Tulu Letter u		Fig. 16 in document L2/21-188 / Dec, 2019		Tulu Script exam answer sheet
Tulu Letter ū		Page 20 in document L2/21-019 / Dec, 2020		Tulu Script exam answer sheet
Tulu Letter ṛ		Tulu Purpa Book / Aug, 2022		Tulu Script exam answer sheet
Tulu Letter ṝ		Tulu Purpa Book / Aug, 2022		Tulu Script exam answer sheet
Tulu Letter e		Fig. 84 in document L2/21-188 / Dec, 2020		Tulu Script exam answer sheet
Tulu Letter ē		Tulu Purpa book / Aug, 2022		Tulu Script exam answer sheet
Tulu Letter è		Tulu Purpa Book / Aug, 2022		Tulu Script exam answer sheet
Tulu Letter é		Page 20 in document L2/21-019 / Dec, 2020		Tulu Script exam answer sheet
Tulu Letter ai		Tulu Purpa book / Aug, 2022		Tulu Script exam answer sheet
Tulu Letter o		Tulu Purpa book / Aug, 2022		Fig. 55 in document L2/21-188
Tulu Letter ō		Page 20 in document L2/21-019 / Dec, 2020		Tulu Script exam answer sheet

Tulu Letter au		Page 20 in document L2/21-019/ Dec, 2020		Fig. 55 in document L2/21-188
u letter am		Fig. 22 in document L2/21-188/ Feb, 2021		Fig. 55 in document L2/21-188
Tulu letter (aḥ)		Fig. 22 in document L2/21-188/ Feb, 2021		Fig. 55 in document L2/21-188

IAST	Printed	Referred Source (Printed) / date	Handwritten	Refereed Source (Printed) / date
Tulu Letter ka		Fig. 51 in document L2/21-188/ Nov, 2020		Fig. 26 in document L2/21-188
Tulu Letter kha		Tulu Purpa book		Fig. 55 in document L2/21-188
Tulu Letter ga		Fig. 29 in document L2/21-188/ Dec, 2019		Fig. 46 in document L2/21-188
Tulu Letter gha		Page 20 in document L2/21-019/ Dec, 2020		Tulu Script exam answer sheet
Tulu Letter ña		Tulu Purpa book		Fig. 55 in document L2/21-188
Tulu Letter ca		Fig. 51 in document L2/21-188/ Nov, 2020		Fig. 23 in document L2/21-188
Tulu Letter cha		Page 20 in document L2/21-019/ Dec, 2020		Tulu Script exam answer sheet
Tulu Letter ja		Fig. 44 in document L2/21-188/ Jun, 2018		Tulu Script exam answer sheet
Tulu Letter jha		Page 20 in document L2/21-019/ Dec, 2020		Fig. 55 in document L2/21-188
Tulu Letter ña		Page 20 in document L2/21-019/ Dec, 2020		Fig. 55 in document L2/21-188
Tulu Letter ṭa		Fig. 80 in document L2/21-188/ Feb, 2018		Singara cloth shop receipt
Tulu Letter ṭha		Fig. 31 in document L2/21-188/ Oct, 2019		Tulu Script exam answer sheet
Tulu Letter ḍa		Fig. 51 in document L2/21-188/ Nov, 2020		Fig. 23 in document L2/21-188
Tulu Letter ḍha		Tulu Purpa book		Fig. 55 in document L2/21-188

Tulu Letter ṇa		Fig. 31 in document L2/21-188/ Oct, 2018		Fig. 55 in document L2/21-188
Tulu Letter ta		Fig. 53 in document L2/21-188/ Aug, 2019		Fig. 58 in document L2/21-188
Tulu Letter tha		Fig. 5 in document L2/21-188/ Jul, 2019		Fig. 55 in document L2/21-188
Tulu Letter da		Fig. 72 in document L2/21-188/ Mar, 2020		Fig. 58 in document L2/21-188
Tulu Letter dha		Fig. 87 in document L2/21-188/ May, 2019		Fig. 55 in document L2/21-188
Tulu Letter na		Fig. 53 in document L2/21-188/ Aug, 2019		Fig. 25 in document L2/21-188
Tulu Letter pa		Fig. 39 in document L2/21-188 Mar, 2019		Fig. 38 in document L2/21-188
Tulu Letter pha		Fig. 49 in document L2/21-188/ Nov, 2019		Tulu Script exam answer sheet
Tulu Letter ba		Fig. 87 in document L2/21-188/ May, 2019		Fig. 38 in document L2/21-188
Tulu Letter bha		Fig. 3 in document L2/21-188/ Jan, 2020		Fig. 46 in document L2/21-188
Tulu Letter ma		Fig. 17 in document L2/21-188/ May, 2019		Fig. 25 in document L2/21-188
Tulu Letter ya		Fig. 14 in document L2/21-188/ Mar, 2019		Fig. 26 in document L2/21-188
Tulu Letter ra		Fig. 72 in document L2/21-188 Mar, 2020		Fig. 25 in document L2/21-188
Tulu Letter ṛa		Page 20 in document L2/21-019/ Dec, 2020		Tulu Script exam answer sheet
Tulu Letter la		Fig. 43 in document L2/21-188/ Oct, 2020		Fig. 25 in document L2/21-188

Tulu Letter va		Fig. 50 in document L2/21-188 May, 2019		Fig. 11 in document L2/21-188
Tulu Letter śa		Fig. 56 in document L2/21-188 / Jun, 2020		Fig. 38 in document L2/21-188
Tulu Letter ša		Fig. 18 in document L2/21-188 / Jan, 2020		Fig. 55 in document L2/21-188
Tulu Letter sa		Fig. 53 in document L2/21-188 / Aug, 2019		Fig. 46 in document L2/21-188
Tulu Letter ha		Fig. 6 in document L2/21-188 / Feb, 2019		Tulu Script exam answer sheet
Tulu Letter ḷa		Fig. 33 in document L2/21-188 / Feb, 2018		Fig. 25 in document L2/21-188
Tulu Letter ḷa		Page 20 in document L2/21-019 / Dec, 2020		Tulu Script exam answer sheet
Tulu Symbol SHRI		Fig. 65 in document L2/21-188 / Feb, 2021		Fig. 25 in document L2/21-188
Tulu Letter õṃ		Fig. 22 in document L2/21-188 Feb, 2021		Tulu Script exam answer sheet

Digits/Numbers	Printed	Referred Source (Printed) / date	Handwritten	Referred Source (Handwritten)
Tulu Digit 0		Fig. 83 in document L2/21-188 / Jan, 2020		Tulu Script exam answer sheet
Tulu Digit 1		Fig. 22 in document L2/21-188 / Feb, 2021		Fig. 55 in document L2/21-188
Tulu Digit 2		Fig. 22 in document L2/21-188 / Feb, 2021		Fig. 26 in document L2/21-188
Tulu Digit 3		Fig. 83 in document L2/21-188 / Jan, 2020		Fig. 55 in document L2/21-188
Tulu Digit 4		Fig. 22 in document L2/21-188 / Feb, 2021		Tulu Script exam answer sheet
Tulu Digit 5		Pg. 146 in document L2/21-188 / May, 2018		Tulu Script exam answer sheet
Tulu Digit 6		Pg. 146 in document L2/21-188 / May, 2018		Fig. 55 in document L2/21-188
Tulu Digit 7		Pg.146 in document L2/21-188 / May, 2018		Fig. 55 in document L2/21-188
Tulu Digit 8		Fig. 19 in document L2/21-188		Tulu Script exam answer sheet
Tulu Digit 9		Pg. 146 in document L2/21-188 / May, 2018		Tulu Script exam answer sheet
Tulu Number 10		Fig. 22 in document L2/21-188 / Feb, 2021		Fig. 55 in document L2/21-188
Tulu Number 100		Fig. 22 in document L2/21-188 / Feb, 2021		Fig. 55 in document L2/21-188

Table 18: Modern Printed and Handwritten Evidence

❖ Character Chart

Character Chart as evidence is shown in [Table 1](#) and [Tulu Script Chart](#)

❖ **avagraha**

As of now scholars have come to conclusion that Tulu Script does not need avagraha, where as in rare occasion if need arises, we can adopt the same from other scripts.

7.8. Editorial Feedback

- **Page 20: Provide higher resolution image, include source and date of the article**

The article in page number 20 of [L2/21-019](#) have used 'srihari' font which is based on the script structure followed before standardization. Since it is an old article, we could not get the clear image.

- **Page 24: Provide higher resolution image, include source and date of the invitation.**

English and Tulu Version of marriage invitation dated 21st February 2019 is shown in below Image.



Fig.4: Marriage Invitation

- Page 7 shows for TULU LETTER VOCALIC ṛ ṛ but Page 20 shows as evidence. Either fix the reference form to not include the bottom right loop or include evidence for the proposed form.

The character ṛ ṛ is written including the bottom right loop as shown in [Table 1](#)

Final form of VOCALIC ṛ ṛ will be ೞ ೞ

- Page 9 shows for TULU VOWELSIGN *anuswara* **am** but Page 20 shows full size sign, e.g. as evidence. Either fix the reference form to be of full size or provide evidence for the proposed form.

The Tulu anusvara sign “am” is represented as shown in [Table 5](#).

- The KTSA started in 2007. Has there been no books yet in the standardised script that could be used as evidence?

KTSA started in the year 1994. There have been many books published in Tulu Script since the beginning of script activities at Tulu academy. In the process of standardisation as the script adopted changes, the literature script also varied. “Tulu Purpa” is the most recent publication (Aug-2022) where completely standardised script is used.

- The provided figures show script behaviour not covered in the proposal, such as **ಉಪಖಣಿತ**
Can these be explained in the text?

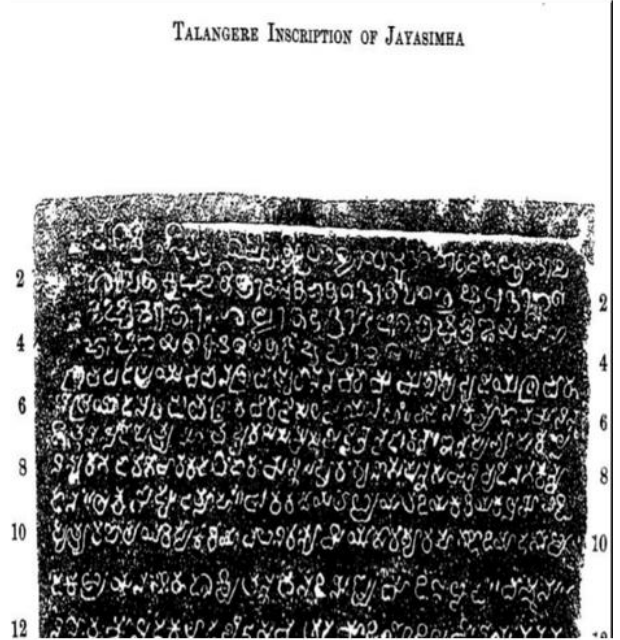
These are historic cases and have been replaced by modern usage scenarios and are updated in this document.

8. Response to Review [L2/22-023](#)

- Clear images of Stone inscriptions are shown here with in response to note mentioned in page number 18 of [L2/22-023](#)



Kolana Kodu, Basrur Kundapura Taluk - Udupi District



Jayasimha Talngere, Kasragodu - 980-1000 C.E



Malali, South Canara - Mangalore



Vishnumoorthi Temple, Kodangala Marne - Udupi
11th Century

Fig 5: Stone inscriptions

- The current KTSA Tulu proposal does not provide a summary code chart for easy reference, but refers to glyphs printed one-per-page in [L2/21-188](#) (on pp. 1-99). This approach makes it very difficult to follow the overall structure of the proposal. For example, a reviewer cannot easily see all the vowel signs that are proposed, nor can they quickly grasp the independent vowels versus dependent and “part-vowel formations” being proposed, or any other signs that are proposed. Adding to the confusion, the list of characters in that document contains glyphs beyond what is included in Unicode code charts (e.g., it includes some conjuncts [pp. 74-88]) and does not include code points.

 - Summary code chart for reference is given in [Table 1](#)
 - All the queries have been rectified in that particular table.
- The current KTSA proposal appears to contain similar script information to that submitted earlier, [L2/21-019](#), but because the font isn’t embedded in the latest proposal, the glyphs for Tulu don’t appear, which makes it difficult to do a comprehensive review. In addition, having evidence spread across different documents (such as [L2/21-188](#) and [L2/21-189](#)) makes it challenging to review. Feedback based on the review by Jan Kučera in [L2/20-279](#) has not been addressed, most notably the missing evidence for some of the characters at the top of page 7. This is most important, as evidence for all proposed characters needs to be clearly documented.

 - We have addressed all the feedback/queries raised by Prof. Jan Kucera in [Page No 19](#)
- The proposed code points (U+11B50..U+11BAF) are not on the Roadmap for Tulu. Any subsequent proposal should use code points XXXX0, XXXX1, etc. Such a proposal should include the list of characters, their names and properties, and all the evidence in one document, as well as specific details on the difference in the behavior between modern Tulu and Tulu-Tigalari (as proposed in [L2/22-031](#)).

 - The proposal code points are shown in [Table 1](#) with all the raised concerns rectified.
 - The Tulu characters, their names and properties are shown in [Table 2A](#)
 - Specific details on the differences in the behaviour between Tulu, Tigalari & Malayalam are shown in [Table 14](#)
- In our analysis, the “Tulu” script for modern Tulu appears to be based on the historic script proposed by Murthy/ Rajan, which is intended specifically for digitization of manuscripts. If specific evidence is provided identifying differences in the behavior of modern Tulu, separate encoding for modern Tulu may be considered. To state it in another way, if the modern script deviates in behavior from the historic script, that might provide evidence suggesting that encoding a separate, modern Tulu script may be needed.

 - Historical, Modern Printed, Modern handwritten evidences to identify differences of modern Tulu is given in [Table 16](#).

9. Deviation of modern Tulu script from Historic Tulu script

● It is of no doubt that usage of Tulu script started at least as early as 8th century. Available oldest Tulu inscriptions date back to centuries and more. Since then there has been a lot of changes in the language (Palantulu to Tulu) and so the script. Let it be Tulu-Malayalam, Tigalari or the modern Tulu script, all trace back their origin to this script.

The modern Tulu script has gone a lot of changes compared to other writing systems of this line. A major portion of Tulu population undergoes formal education in Kannada and the Kannada writing system has greatly influenced Tulu script. Even though Tulu script has retained basic letters from historic one, the conjunct form of historic script is not much popular in the masses. These deviations from historic script is shown below.

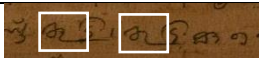
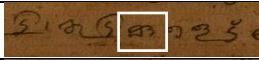
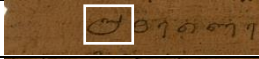
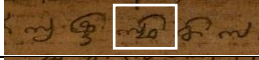
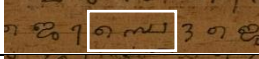
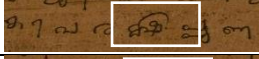
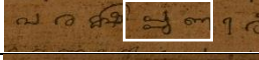
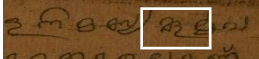
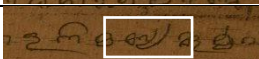
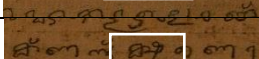
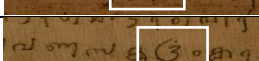
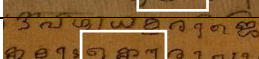
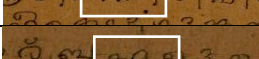
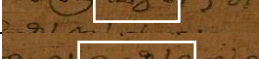
Letter/Cluster	Modern form	Historic Evidence
tu	ತು	
ku	ಕು	
pra	ಪ್ರಾ	
sthi	ಸ್ಥಿ	
svē	ಸ್ವೇ	
kṣi	ಕ್ಷಿ	
ppu	ಪ್ಪು	
kū	ಕು	
tsya	ತ್ಸಾ	
kṣa	ಕ್ಷಾ	
dra	ದ್ರಾ	
kau	ಕೌ	
hma	ಹ್ಮಾ	
ṣyō	ಷ್ಯೌ	

Table 19: Comparing modern standards with historic form of Tulu script

Comparing Standard numbers and Historic number system

Name	Standard	Historical
TULU DIGIT ONE	೧	
TULU DIGIT TWO	೨	
TULU DIGIT THREE	೩	
TULU DIGIT FOUR	೪	
TULU DIGIT FIVE	೫	
TULU DIGIT SIX	೬	
TULU DIGIT SEVEN	೭	
TULU DIGIT EIGHT	೮	
TULU DIGIT NINE	೯	
TULU NUMBER TEN	೧೦	
TULU NUMBER HUNDRED	೧೦೦	

Table 20: Comparing Standard numbers and Historic number system

- We respect / agree with the reviewer's opinion of encoding modern Tulu and Tulu-Tigalari as separate blocks.

10. Conclusion

- The number of Tulu script fonts that have been under usage crosses two digits. These were developed by different individuals and organizations. Karnataka Tulu Sahitya Academy (KTSA) found that there is need for uniform standardized script, so that there would not be confusion among public belonging to different districts of Karnataka state and Kasaragodu district of Kerala state.
- Karnataka Tulu Sahitya Academy (KTSA) in consultation with Tulu linguistic scholars, epigraphists, paleographer and script teachers, has standardized Tulu script as explained below, which would be convenient for usage in accordance to currently spoken Tulu language.
- Standard form adopted by the Karnataka Tulu Sahitya Academy (KTSA)



Fig 6: Tulu Script Chart

Source: "Tulu Purpa" book published by Jai Tulunad (R.)

- The image below shows the chart published by Tuluver Kudla (R.)



Fig 7: Tulu script chart

- As per new policy (NEP – National Educational Policy) central government primary education to be given in individuals mother tongue, Tulu sooner may have its role. At this juncture, Tulu which already being taught as 3rd optional language in primary and higher primary schools shall need encoding script characters at the earliest.

11. REFERENCES:

- ❖ Tulu Ramayana
- ❖ Tulu Mahabharatho - 1383 AD
- ❖ Tulu Vedanta Sara Prakarana
- ❖ Tulu Ananthavratha Kathe
- ❖ Horoscope – Year 1906
- ❖ Shri Dharamshala Manjunatheshwara Sanskriti Prathistana, Dharamsthala
- ❖ Dr Radha Krishna Bellur – Author Tulu Lipi Parichaya & Kannada Professor
- ❖ Dr. Keladi Gunda Joisa - Author “Alivinanchinalliruva Tigalari lipi hasthaprathigalu”
- ❖ “Tulu Purpa” book by Jai Tulunad (R.)
- ❖ “Tulu Sasanagalu” by Prof Krishanayya, Radhakrishna Bellur, & Subhas.
- ❖ “Rigveda” by Srinivasa Upadhyaya Karkala
- ❖ “Bhagavadgeetha” Private collection by a resident of Sullia

Special Thanks:

- ❖ Belur Sudharshana – Advisor(E-Governance) to Chief Minister of Karnataka
- ❖ Subhanan Mandal, CIIL Mysore
- ❖ Dr. Vignaraj, Dharmasthala
- ❖ Dr Radhakrishna Bellur, Epigraphist
- ❖ Vinay Rai, Shirdi Sai Pro-creations, Mangalore
- ❖ Subhas Nayak, Shirva - Udupi
- ❖ Jai Tulunad (R.) Organization
- ❖ Tuluver Kudla (R.) Organization

Thank you