

Malayalam Fractions and Letter-Numerals

1.0 Introduction

South Indian scripts such as Malayalam and Tamil have two systems of numeration. The ordinary decimal system is called *angapalli* and this angapalli digits are encoded for Malayalam as U+0D66, U+0D67, ... U+0D6F and they correspond to Hindu-Arabic digits 0, 1, ... 9 respectively. There is another system of numeration, called *aksharapalli* (syllabic) for Malayalam (Reference 1) and Tamil (Reference 2). In a separate Unicode block that can be named as South Indian Supplement, Malayalam aksharapalli numerals, fractions and symbols can be added. In the same Unicode block, Tamil fractions, symbols, syllabic numerals, measures etc., will be added in the future. So also, Kannada and Telugu symbols, fractions can be dealt with in Unicode. It is requested in this proposal to encode available (a) Malayalam fractions in ascending order and (b) Malayalam aksharapalli numerals in South Indian Supplement block in Unicode code charts. Another possible name for the "South Indian Supplement" can be "Dravidian Scripts Extended" block. Malayalam fractions and aksharapalli numerals are needed for digitizing and preserving old Malayalam manuscripts and account books.

2.0 Malayalam Aksharapalli Numerals

"One of the systems for numeration in India is syllabic (aksharapalli), as contrasted with the ordinary decimal system (angapalli). The main features of these systems have often been explained (Indian Antiquary, vi, pp. 42, 143; A. C. Burnell, "South Indian Paleography", ed. ii, p. 65...)" (page 789, On a system of Letter-numerals used in South India, by Cecil Bendall, JRAS, 1834, pp. 789-792).

Table 1. Malayalam Aksharapalli Numerals

ന	ന്ന	ശൃ	ശൃ	ശൃ	ഹാ	ഗ	പ	ശ്ശ
na	nna	nya	škra	jhra	hā	gra	pra	dre
1	2	3	4	5	6	7	8	9
൧	൧൦	൧൧	൧൨	൧൩	൧൪	൧൫	൧൬	൧൭
ma	tha	la	pta	ba	tra	rū	cha	ṇa
10	20	30	40	50	60	70	80	90
൧൦൦								
n̄a								
100								

This table is taken from page 94 of Reinhold Grunendahl, South Indian Scripts in Sanskrit manuscripts and prints: Grantha Tamil - Malayalam - Telugu - Kannada - Nandinagari. (2001: Harrassowitz Verlag, Wiesbaden, Germany).

3.0 Malayalam fractions in ascending order

Manavan Mappilla's Malayalam arithmetic book, KaNakkadhikaaram lists the Malayalam fractions (Table 2).

Table 2. Malayalam Fractions

ആയിരം നൂറ് = 1000	നൂറ് നൂ = 100	പത്തു പ = 10	ഒന്ന് ഒ = 1
രണ്ടു ര = 2	മൂന്നു രൂ = 3	നാലു രൂ = 4	അഞ്ചു രൂ = 5
ആറു നൂ = 6	ഏഴു നൂ = 7	ഏഴു പ = 8	ഒമ്പതു നൂ = 9
മൂക്കാൽ പ = $\frac{3}{4}$	അര രൂ = $\frac{1}{2}$	പാലു പ = $\frac{1}{4}$	അരക്കാലു പ = $\frac{1}{8}$
രണ്ടു മാ പ = $\frac{1}{10}$	മാ കാണി രൂ = $\frac{1}{16}$	ഒരു മാ പ = $\frac{1}{20}$	അര മാ രൂ = $\frac{1}{40}$
കാണി രൂ = $\frac{1}{80}$	അരകാണി പ = $\frac{1}{160}$	മൂന്നിരി രൂ = $\frac{1}{320}$	കീഴ് കാലു $\frac{1}{320}$ ($\frac{1}{4}$)
മൂന്നു കാണി രൂ = $\frac{3}{80}$	നാലു മാ രൂ = $\frac{1}{4}$	മൂന്നു മാ പ = $\frac{3}{20}$	അരകാണി മൂന്നിരി പ = $\frac{1}{160} + \frac{1}{320} = \frac{3}{320}$

The Malayalam fractions in ascending order are: 0.003125, 0.00625, 0.0125, 0.025, 0.0375, 0.05, 0.0625, 0.10, 0.125, 0.15, 0.20, 0.25, 0.5, 0.75. It is requested to encode these fractions in the South Indian Supplement block in Unicode. As it can be seen, the three Malayalam fractions (1/4, 1/2, 3/4) in U+0D73, U+0D74, U+075 locations in the Unicode pipeline are just a small subset of the available fractions in Malayalam. It is requested that these fractions' symbols for 0.25, 0.5 and 0.75 also be moved to the South Indian Supplement block. The Malayalam letter-numerals and fractions are useful in the study and digitizing of old Malayalam books and manuscripts.

4.0 South Indian Supplement block in Unicode

	xx0	xx1	xx2	xx3	xx4	xx5	xx6	xx7
0	ஃ		௩	ஔ				
1	஄		௴	௵				
2	அ		௶	௷				
3	ஆ		௸					
4	இ		௹					
5	ஈ		௺					
6	ஊ		௻					
7	஋		௼					
8	஌		௽					
9	஍		௾					
A	எ		ி					
B	ஏ		஻					
C	஑		஼					
D	ஓ		஽					
E			஼					
F			஼					

Code point – Unicode Character Name

xx00	MALAYALAM FRACTION 0.003125
xx01	MALAYALAM FRACTION 0.00625
xx02	MALAYALAM FRACTION 0.0125
xx03	MALAYALAM FRACTION 0.025
xx04	MALAYALAM FRACTION 0.0375
xx05	MALAYALAM FRACTION 0.05
xx06	MALAYALAM FRACTION 0.0625
xx07	MALAYALAM FRACTION 0.1
xx08	MALAYALAM FRACTION 0.125
xx09	MALAYALAM FRACTION 0.15
xx0A	MALAYALAM FRACTION 0.2
xx0B	MALAYALAM FRACTION 0.25
xx0C	MALAYALAM FRACTION 0.5
xx0D	MALAYALAM FRACTION 0.75
xx20	MALAYALAM AKSHARAPALLI NUMERAL ONE
xx21	MALAYALAM AKSHARAPALLI NUMERAL TWO
xx22	MALAYALAM AKSHARAPALLI NUMERAL THREE
xx23	MALAYALAM AKSHARAPALLI NUMERAL FOUR
xx24	MALAYALAM AKSHARAPALLI NUMERAL FIVE
xx25	MALAYALAM AKSHARAPALLI NUMERAL SIX
xx26	MALAYALAM AKSHARAPALLI NUMERAL SEVEN
xx27	MALAYALAM AKSHARAPALLI NUMERAL EIGHT
xx28	MALAYALAM AKSHARAPALLI NUMERAL NINE
xx29	MALAYALAM AKSHARAPALLI NUMERAL TEN
xx2A	MALAYALAM AKSHARAPALLI NUMERAL TWENTY
xx2B	MALAYALAM AKSHARAPALLI NUMERAL THIRTY
xx2C	MALAYALAM AKSHARAPALLI NUMERAL FORTY
xx2D	MALAYALAM AKSHARAPALLI NUMERAL FIFTY
xx2E	MALAYALAM AKSHARAPALLI NUMERAL SEVENTY
xx2F	MALAYALAM AKSHARAPALLI NUMERAL SEVENTY
xx30	MALAYALAM AKSHARAPALLI NUMERAL EIGHTY
xx31	MALAYALAM AKSHARAPALLI NUMERAL NINETY
xx32	MALAYALAM AKSHARAPALLI NUMERAL ONE HUNDRED

Tamil script manuscripts and books also have many fractions, symbols and letter-numerals which will also be encoded in the South Indian Supplement block. So also, Telugu and Kannada symbols can be placed in the South Indian Supplement. For example, more symbols and fractions and also those from L2/06-250 for Telugu script can also be added in the South Indian Supplemental block. In addition, the North Indian scripts' measures, weights, symbols can be also placed in an adjacent block

5.0 References

- (1) H. Gundert, Grammar of the Malayaalm language, 2nd edition, Mangalore, 1868, pp. 41-42.
- (2) Arthur Coke Burnell, South Indian paleography, 2nd edition, 1878, p. 65