CONCEPT OF DIVISIBILITY IN CAMPU RAMAYANA

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Abstract: The King *Bhoja*, who was considered as the Alter-ego of *Kālidāsa*, has narrated the story of *Rāmāyaṇa* as a *Campū* (**चम्पू**) which is a mixture of prose and poetry. For ancient Sanskrit poets there was no demarcation between Arts and Science, as it is prevalent today. This fact is revealed to a certain extent in this paper, where we find the concept of divisibility by 11 in a verse of *Campū Rāmāyaṇa* (5.2) (☐☐☐☐☐☐☐☐☐☐☐ 5.2) using the clue given by *Śrī Vedānta Deśika* in his didactic lyric '*Subhāṣitanīvī*' (Ch.6, Ver.4)

Keywords: *Campū Rāmāyaṇa*, Bhoja. divisibility by 11, Ancient Vedic Numerical Code.

INTRODUCTION:

Sanskrit Literature is divided into 2 types - *Dṛśya* (☐☐☐☐☐), which can be enacted on stage, and *Śravya* (☐☐☐☐☐☐), which can only be heard or read. The ten varieties and eighteen sub varieties of drama fall under *Dṛśyakāvya* and *Śravyakāvya* is classified as *Gadyam* (☐☐☐☐☐☐), which is prose, *Padyam* (☐☐☐☐☐☐), which is poetry and *Campū* (☐☐☐☐☐), which is a mixture of *Gadyam* and *Padyam*. *Campū Rāmāyaṇa,* the best *Campū* ever written in Sanskrit, was composed by King *Bhoja* in 11th century CE. This composition is based on *Vālmīki Rāmāyaṇa* and it is in condensed form. We find rich and powerful diction, cunningly fashioned alliteration, adroitly developed vowel music, sumptuously appropriate cadence and a rare combination of learning, beauty, intuition and philosophy. King *Bhoja* was a ruler of the *Mālwa* Kingdom. He had composed the *Campū Rāmāyaṇa* till *Sundarakāṇda* and *Yuddhakāṇda* was a later addition by the poet *Lakṣmaṇa Sūrī*. Two other important works of King *Bhoja* are *Sarasvatī Kaṇṭhābharaṇam* (☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐) and *Śṛṅgāraprakāśaḥ* (☐☐☐☐☐☐☐☐☐☐☐☐☐☐) .

A mathematical concept of divisibility is present in one of the verses of *Sundarakāṇda* of *Campū Rāmāyaṇa*. This concept has been found using the clue given by *Śrī Vedānta Deśika* in his didactic lyric '*Subhāṣitanīvī'* (Chapter 6 Verse 4)

Katapayādi **Coding Scheme**

Vedic Scholars adopted a different but convenient system of letter notation called the *Katapayādi* or Vedic Numerical code. In this system,

- the consonants (*vyanjanas*) beginning with *ka* (□), *ṭa* (□), *pa* (□) and *ya* (□) referred the digits from 1 to 9 (i.e. letters from *ka* (□) to *jha* (□), from *ṭa* (□) to *dha* (□) denote 1 to 9;
- *pa* (□) to *ma* (□) stand for 1 to 5;
- letters from *ya* (□) to *ha* (□) represent the digits 1 to 8;
- the nasals *ña* (□) and *na* (□) denote 0;
- in the case of conjunct consonants, the number denoted only by the last consonant is taken
- the vowels following consonants have no value
- the arrangement of the digits is from right to left as per the rule *aṅkānāṃ vāmato gatiḥ* (□□□□□□□□ □□□□□ □□□□)
- the letter *ḻa* (□) peculiar to the Dravidian languages, represent 9.

The rule is:

kādi nava, ṭādi nava, pādi pañca, yādyaṣṭau

- *Kādi nava* means *ka* and the following eight letters.
- *ṭādi nava* means *ṭa* and the following eight letters.
- *Pādi pañca* means *pa* and the following four letters.
- *Yādyaṣṭau* means *ya* and the following seven letters.
- *Ksha* represents zero.

To make this more clear and understandable, the notation is given by the following table:

Table 1. Vedic Numerical Code (Katapayādi system)

Category		1	2	3	4	5	6	7	8	9	0
Kādinava		□	□	□	□	□	□	□	□	□	□
		ka	kha	ga	gha	ńa	ca	cha	ja	jha	ña
Tādinava		□	□	□	□	□	□	□	□	□	□
		ṭa	ṭha	ḍa	ḍha	ṇa	ta	tha	da	dha	na
Pādipanca		□	□	□	□	□					
		pa	pha	ba	bha	ma					
Yādyashtau		□	□	□	□	□	□	□	□	ಐ	□□□
		ya	ra	la	va	śa	sha	sa	ha	ḻa	ksha

Hence

a) The Vowels are not included in the list.

b) They are exempted because, only the consonants with vowels are assigned

numbers.

c) In conjunct consonants, the last consonant alone is to be coded.

Svāmī Śrī Vedānta Deśika applies this Vedic numerical code to reveal the algebraic concept of divisibility by eleven (11) in the following verse of his didactic lyric 'Subhāshitanīvī'.

Verse:

□□□□□□□□□□□□□□□□□□□-
□□□□□□□ □□□□□□□□ □
□□□□□□□□□□□□□□□□□□□□
□□□□□□□ □□□□□□□□□□ □(Chap 6 Verse 4)

Transliteration of the verse:

Dharma setu nivishtānā
macalānām garīyasām□
dakshinottara vrttīnām
drishtiḥ pāpanivartanī □

One literary meaning of the verse:

The noble men always follow the path of Dharma; they are unbending and uncompromising in their adherence to principles; they are bent on removing the ignorance of ordinary human beings. The benign look of these great men will remove our sins.

Table.2 - Vedic Numerical Coding of the Verse 6-4 of the text

Line 1	9	5	7	6	0	4	1	0
Line 2	5	6	3	0	3	2	1	7
Line 3	8	0	5	6	2	4	6	0
Line 4	8	1	1	1	0	4	6	0

In this verse the word **pāpa** (□□□) is decoded as the number 11 using Vedic numerical code. When the poet says **pāpa nivartanī** (□□□□□□□□□□), he suggests the algebraic concept of 'divisibility by 11'. The following table is self-explanatory:

Table.3 - The words of the verse 6-4 of the text decoded with meaning

Line Number	Word	Decoded Number	Meaning of the word
2	Acalānām (□□□□□□□)	--	Of the constants (6th case)
4	drishtiḥ (□□□□□:)	18	Eighteen (digits)
4	pāpa (□□□)	11	The number 11
4	Nivartanī (□□□□□□□)	--	is divided exactly

Hence we get the following suggestion:

Acalānām drishtiḥ pāpanivartanī (□□□□□□ □□□□□□ □□□□□□□□□□), which means 'the 18-digit number is exactly divisible by 11'.

WORKING:

Take the middle 18 digits from the verse omitting the first 4 digits corresponding to the word **Dharma setu** (□□□□□□□); the first four digits are omitted since the poet asks the reader to consider 'the banks of **Dharma** (□□□□)'only. Then we are left with 32 – 4 = 28 digits only. Considering the middle 18 digits among these 28 digits we get the following number:

6 3 0 3 2 1 7 8 0 5 6 2 4 6 0 8 1 1

A = Sum of the digits at odd places of the above number = 26

B = Sum of the digits at even places of the above number = 37

Using the criterion for divisibility by 11, we see that

$|A - B| = |26 - 37| = 11$ so the number is divisible by 11.

The same concept of divisibility is found in his another Stotra work Sristuti as revealed below:

Extension of the above application of divisibility by 11 to *Campū Rāmāyaṇa*

Using the clue given in the above śloka of Sri Vedanta Desika, it is verified that the 76-digit number obtained by decoding the second verse of *Sundarakāṇda* of *Campū Rāmāyaṇa*, which contains the word 𑀲𑁂𑀢𑁄 (*Setoḥ*) is also divisible by 11.

Verse from *Campū Rāmāyaṇa*

𑀓𑀾𑀢𑁆𑀯𑀸 𑀫𑀸𑀭𑀼𑀢𑀺-𑀮𑀗𑁆𑀖𑀦𑁄𑀢𑁆𑀣𑀺𑀢𑀭𑀬𑀸𑀢𑁆 𑀢𑀢𑁆𑀭𑀸𑀦𑀼𑀬𑀸𑀢𑁆𑀭𑀸𑀫𑁆 𑀢𑀢𑀂

𑀧𑀭𑁆𑀬𑀸𑀢𑁆𑀧𑀢𑀺𑀢𑀸 𑀫𑀳𑁂𑀦𑁆𑀤𑁆𑀭𑀕𑀳𑀦-𑀓𑁆𑀱𑁄𑀡𑀺𑀭𑀼𑀳𑀸𑀡𑀸𑀫𑁆 𑀢𑀢𑀺𑀂 ।

𑀫𑀧𑁆𑀬𑁂𑀯𑀸𑀭𑀺𑀦𑀺𑀥𑀺 𑀧𑁆𑀭𑀓𑀸𑀱𑀺𑀢-𑀰𑀺𑀔𑀸 𑀲𑁂𑀢𑀂 𑀓𑀾𑀢𑁂 𑀪𑀸𑀯𑀺𑀦𑀂

𑀲𑀽𑀢𑁆𑀭𑀦𑁆𑀬𑀸𑀲 – 𑀦𑀺𑀔𑀸𑀢 – 𑀰𑀗𑁆𑀓𑀼𑀦𑀺𑀯𑀳 – 𑀪𑁆𑀭𑀸𑀦𑁆𑀢𑀺𑀫𑁆 𑀧𑀬𑁄𑀥𑁌 𑀤𑀥𑁌 ॥ (𑀘𑀫𑁆𑀧𑀽𑀭𑀸𑀫𑀸𑀬𑀡𑀫𑁆 5.2)

Transliteration:

    Kṛtvā māruti-laṅghanotthitarayāt tatrānuyātrāṃ tataḥ

        Paryāyātpatitā mahendragahana-kṣoṇiruhāṇāṃ tatiḥ

    Madhyevārinidhi prakāśita-śikhā setoḥ kṛte bhāvinaḥ

        Sūtranyāsa – nikhāta – śaṅkunivaha – bhrāntiṃ payodhau dadhau *(Campū Rāmāyaṇam 5.2)*

Meaning of the verse:

    The group of trees that were uprooted by the speed with which *Hanumān* jumped from the *Mahendra* mountain, followed him to some distance and then fell one by one into the ocean. The top portions of the mountains, that were visible above the waters, created an illusion as if they were the pillars fixed with threads, for the future bridge to be built by *Śrī Rāma*.

Table.4 - Vedic Numerical Coding of the Verse 5.2 of the text

Position	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Line 1	1	4	5	2	6	3	4	0	7	6	2	1	6	2	0	1	2	6	6
Line 2	1	1	1	1	6	6	5	8	2	3	8	0	0	5	2	8	5	6	6
Line 3	5	1	4	2	0	9	2	1	5	6	5	2	7	6	1	6	4	4	0
Line 4	7	2	1	7	0	2	6	5	1	0	4	8	2	6	1	1	9	8	9

There are 19 syllables in each *Pada* and hence 76 syllables of the verse. The 76-digit number obtained from the above table is

1452634076216201266111665823800528566514209215652761644072170265104
82611989

A = Sum of the digits at odd places of the above number = 149

B = Sum of the digits at even places of the above number = 138

Using the criterion for divisibility by 11, we see that

|A - B| = |149-138| = 11 and hence, the 76-digit number is also divisible by 11.

CONCLUSION:

    Bhoja, who was a Poet among Kings, was really a King among Poets. He was versatile genius who touched nothing without adorning it. His wonderful mastery over language and science is admirably revealed in his work as shown in the above verse as a sample.

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