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INTEGRATION OF VEDIC MATHEMATICS AND INDIAN WISDOM INTO CONTEMPORARY EDUCATION

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Abstract: *India has a very prestigious history in education system. The Indian Knowledge System (IKS) has reflective contributions of various fields of knowledge, incorporating philosophy, anatomy, medicine, science, astronomy, linguistic and various field of study. Among the many intellectual achievements of ancient India, Vedic Mathematics holds a significant place, offering unique methods of solving mathematical problems efficiently in a short period of time. The study explores the historical roots, core of principles, applications, advantages and challenges of Vedic mathematics. It offers a sight into the bright of ancient Indian mathematical thought and it continues utility in modern education and problem-solving.*

Keywords: Education, Vedic Mathematics, Indian Vedic Education System, Indian Knowledge System, Modern Education System.

Introduction

The Indian Knowledge system represents a rich and diverse body of intellectual Heritage that has been passed down through generations. The concept of knowledge in India has always been holistic, about spirituality, science and mathematics. Indian scholar from time to time of the Vedic period (500 to 500 BC) contributed immensely to the development of mathematics principle the development of the mathematic concept such as zero, infinity and the decimal system is attributed to ancient scholar. Central to this mathematical inheritance is Vedic mathematics compilations of technique found in the ancient Vedic texts, designed to solve arithmetic problems.

Vedic mathematic refers to side of techniques and methods for solving and algebraic problems, primary derived from Vedas, the ancient scriptures of Indian. It is a system of solving complex arithmetic problems in a unique and remarkable ways. These techniques and methods are known for dear simplicity, speed and efficiently, and making them relevant not only in the ancient context but also in the contemporary mathematical education.

Aims of the Study

The purpose of the study is:

1. To study the origin of the Indian knowledge system with mathematics.
2. To explore the important principles of the Vedic mathematics.
3. To evaluate the applicability of mathematics and modern-day mathematical problem solving.
4. To examine the advantages of Vedic mathematics in modern education.
5. To analyse limitations of Vedic Mathematics and contemporary education.

Historical background of Indian knowledge system and mathematics

The contributions of India to global knowledge and the civilization from the thousand years back. The primary records of Indian intellectual achievements are found in the Vedas, which are these oldest known scriptures in human history. These texts summarize knowledge about the various subjects such as cosmology, spirituality, geometry, astronomy and the mathematics. The Vedas are foundations of Indian knowledge system consisting of four major texts: Rigveda, Yajurveda, Samaveda and Atharva Veda. These texts contain hymns, philosophical teaching, and scientific insights. The mathematical knowledge contained within the Vedas include concept like geometry, algebra and human number theory. These philosophical texts delve into deeper metaphysical concept and reflect on the nature of the universe, human existence, and consciousness. They also indirectly influence the development of mathematical thought by promoting abstract thinking. Texts like the Arya

Bhatiya and brahmas Phutasidhananta have contributed significantly to the development of Indian Mathematics, detailing easy knowledge of geometry, trigonometry, and arithmetic.

Magical beauty of 16 sutras in Vedic mathematics:

1.Ekadhikena Purvena: Meaning of this sutra is, by one more than the previous one.

Example:

85

×85

7225
(*5×5=25)
(*8×9=72)

2.**Nikhilam Navatashcaramam Dashatah:** Meaning of this sutra is, All from 9 and the last from 10. This formula can be applied in multiplication of numbers, which are nearer to the bases like 10,100,1000…

Type-1(Less than 100)
97 -3(i.e.3 less than from 100)
×94 -6(i.e.6 less than from 100)
----
91 18
(*6×3=18)
(*97-6=91 or 94-3=91)

Type-2(More than 100)
102 +2(i.e. 2 more than 100)
×104 +4 (i.e. 4 more than 100)
----
106 08
(*2×4=08)
(*102+4=106 or 104+2=106)

3. Urdhva-Tiryagbhyam: Meaning of this sutra is vertically and crosswise.
Example**:**

2 1

×3 2
----
6 7 2
(*1×2=2)
(*2×2 +3×1=7)
(*3×2=6)

4. Paraavartya Yojayet: Meaning of this sutra is Transpose and apply.

This sutra is use in general for division when divisor is close to the base 100,1000 etc.

Example:

3698 ÷112
Base is 100. Divisor is 12 more.
1 1 2 | 3 6 9 8|
-1-2 | -3 -6
-3 -6
----
3 3 0 2

33 is the quotient and 2 is the remainder.

5.Shunyam Saamyasamuccaya: Meaning of this sutra is, if common factor is same then it is zero.

Example:

7(x+1) =8(x+1) Here the common factor is (x+1). So, it is zero.

So, x+1=0 =>x=-1.

6. Anurupyena: Meaning of this sutra is proportionately.

Example:46×44

Taking base =40, Multiplication base=10×4=40, Division=100/2=50

46 +6

44 +4

Cross Add of first column and multiplication of second column

50 24(keep 4 and 2 as carry)

×4(multiplication base)

200 +carry 2=2024(Answer)

7. Sankalana-Vyavakalanabhyam: Meaning of this sutra is by addition and subtraction.

Example:43+8=43+10-2=51,33+19=33+20-1=52.

8. Puranapuranabhyam: Meaning of this sutra is by completion and non-completion.

Example:9999×2345

One less than is 2344
Subtraction:9999-2344=7655
Answer :2344 7655

9. Chalana-kalanabyham: Meaning of this sutra is differences and similarities

This sutra represents the differential calculus. It is mainly used to solve a quadratic equation.

As per this sutra if $ax^2+bx+c=0$, then $2ax+b=\pm\sqrt{}(b^2-4ac)$.

Example:$x^2+3x+2=0$, then $2x+3=\pm\sqrt{}(9-8)$.so x=-2 and x=-1.

10. Yaavadunam: Meaning of this sutra is whatever the extent of deficiency.

It is used to find the square near the base 10,100,1000 etc.

$(998)^2$

The number is near the base 1000.It is 2 less than 1000.2 can be written as 002.
998 - 002 =996
002×002=004
996004

11. Vyashtisamansthi: Meaning of this sutra is part and Whole. It can be used to multiply with 11,111,1111...type of numbers.
Example: 451×11=4961

12. Shesanyankena Charamena: Meaning of this sutra is the remainder by the last digit.

Using this formula, we can easily convert a fraction to decimal numbers.

	Quotient	Remainder	×7	Last digit
1/7				
10/7	1	3	21	1
30/7	4	2	14	4
20/7	2	6	42	2

1/7=0.142(Approximate)

13. Sopaantyadvayamantyam: Meaning of this sutra is the ultimate and twice are penultimate.

Ultimate +Twice the penultimate (U+2P)

624×12=

Step1: 06240

PU

U+2P=> (6+(2×0)) (2+(2×6)) (4+(2×2)) (0+(2×4))

=>6 14 8 8

=>7 4 8 8

14. Ekanyunena Purvena: Meaning of this sutra is one less than the previous one

Example: 9999×4568

One less than 4568=4567

9999-4567=5432

Answer is: 4567 5432

15. Gunitasamuccayah: Meaning of this sutra is the product of the sum of the coefficient is equal to the sum the coefficient in the product.

$x^2+5x+6=0$

Sum of the coefficient is 1+5+6=12

Higher degree coefficient is 1. substitute x=1 we get (1+3) (1+2) =4×3=12.

16. Gunakasamuccayah: Meaning of this sutra is the factor of the sum are the same as the sum of the factors

Example: $x^2+5x+4=(x+4)\ (x+1)$

$2x+5=(x+4)+(x+1)$

Sub-Sutras: The sub-sutras extend the use of main sutras to more specific scenarios. Sub-sutras can provide very easy and special kind of techniques for solving various types of problems or example squaring numbers, finding square roots, solving simultaneous equations etc.

The following Advantages of Vedic Mathematics

The Vedic mathematics offers various advantageous, making it an effective tool for modern-day education and computation in the contemporary education.

1. Basic Calculations: The sole advantage of Vedic Mathematics is its ability to perform complex calculation quickly. Techniques like cross-multiplication, digit sums, and using proportionality to solve problems rapidly make it easier for students to solve problems mentally.
2. Mental Mathematics: Vedic mathematics encourages mental calculations and memory retention, making it a valuable skill for learners to develop mental agility and speed.
3. Enhanced Problem-Solving Skills: The strategies employed in Vedic mathematics help develop logical thinking and problem- solving skills. By recognizing patterns and relations between numbers, students, students are trained to approach problems in creatives ways.
4. Importance in Competitive Exams: The Vedic Mathematics has found particular relevance in competitive exams such as entrance tests, where speed and accuracy are crucial. Techniques like multiplication by 9,11 and 99, or quick division methods, have been widely adopted by students.
5. Application in Modern-Day Technology: The Vedic Mathematics has application in computer programming and coding, as the simplification of calculation using mental techniques mirrors certain computational systems used in modern technology.

Challenges and Limitations of Vedic Mathematics

The followings challenges and Limitations of the Vedic mathematics are:

1. Difficulty for Beginners: The unfamiliar with the Sutras can be difficult in learning of techniques, they require a different approach to solve the problems than conventional mathematics methods.
2. Documentation and Research are Inadequate: Despite its historical significance, and promoted by various educators, there is a lack of in-depth research and formal academic recognition of Vedic Mathematics techniques in mainstream education and research communities.
3. Lack of Complete Standardization: Although Vedic mathematics has found a place in some educational institutions, its formal approval remains limited. Many students depend on traditional methods.

Discussion and Conclusion

The Indian Knowledge Wisdom has its zenith deeply rooted in the ancient Indian texts 'The Vedas' and 'The Sutras". Its rich cultural heritage and vast knowledge repositories has not only cultural significance but also have tremendous contribution in the field of education.

In the field of mathematics, many modern mathematical concepts that we study and apply today has its inspiration from the core principles of Vedas. Moreover, great Indian scholars like Aryabhata and Brahmagupta and their remarkable work in the field of mathematics and astronomy has contributed tremendously to achieve new milestones in modern mathematics and astronomy.

The *Vedic mathematics* which consists diverse repository of techniques, methods and solutions that can be applied to address modern mathematical problems. The distinctive, systematic and efficient approach of the Vedic mathematics in addressing mathematical problems makes the Vedic mathematics relevancy in modern fields. The simplified calculations, faster and accurate mental calculations facilitate less effort approach to solve mathematical calculations. If incorporated, the ancient mathematical wisdom to our modern education system would eventually bring significant transformation in the field of mathematics in particular and education in general.

Despite having a very unique, distinctive character, the Vedic mathematics face criticisms and challenges in blending and adopting it with modern mathematics, such as no formal integration in curriculum, limited number of research, no standardization and unfamiliarity with

the ancient text. Though Vedic mathematics face challenges and criticisms in its application to modern education system and its widespread adoption, many mathematicians in India and other countries are asserting and recognizing its immense value and productivity that Vedic mathematical techniques bring with them.

Incorporating the Indian Knowledge System and its wisdoms of ancient Vedic mathematics in our school and higher education curriculum and by acknowledging its immense knowledge value would be the greatest tribute to our ancient knowledge. The NEP, 2020 has also issued many guidelines for incorporating Indian Knowledge System to Higher education curricula. It also focuses on conducting researches that would facilitate the process implementing and incorporating Indian Knowledge System on our education system. Further, it could also bring new ideas and ways to address various challenges on blending and adopting it with modern disciplines which would eventually bridge the huge gap between the traditional Indian knowledge and modern education

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