

# REPORT

## One-week online interdisciplinary faculty development program

On

## Significance of Vedic Mathematics in Modern Era

(5<sup>th</sup> December 2022- 10<sup>th</sup> December 2022)

organised by

**Aryabhatta College**

in collaboration with

**Siksha Sanskriti Utthan Nyas**

&

**Mahatama Hansraj Faculty Development Centre**

(A Centre of MoE under PMMMNMTT Scheme)



## INVITE POSTER



**Aryabhata College, University of Delhi**  
accredited with A+ by NAAC (3.38 CGPA)

invites you to the

**Inauguration Ceremony**  
on December 5, 2022, 09:00 am to 11:00 am

of the

**One Week Online Faculty Development Programme**  
on

**Significance of Vedic Mathematics in Modern Era**

Organized in collaboration with

**Shiksha Sanskriti Utthan Nyas (SSUN)**  
&  
**Mahatma Hansraj Faculty Development Centre**  
(A Centre of MoE under PMMMNMTT Scheme)

**Hansraj College**  
(NAAC A+ CGPA 3.62, NIRF Rank #14)  
University of Delhi



**Prof. Nageshwar Rao**  
Vice Chancellor  
IGNOU  
(Chief Guest)



**Prof. Balaram Pani**  
Dean of Colleges  
University of Delhi  
(Guest of Honour)



**Ms. Upasna Agarwal**  
Coordinator, SSUN,  
New Delhi



**Sh. Anil Kumar Thakur**  
Coordinator,  
Vedic Ganit,  
SSUN, New Delhi



**Prof. Manoj Sinha**  
Principal & Patron



**Dr. Naveen Kumar Jain**  
Convener

## VALEDICTORY POSTER



**Aryabhata College, University of Delhi**  
accredited with A+ by NAAC (3.38 CGPA)

invites you to the

**Valedictory Session**  
on December 10, 2022, 11:30 am to 1:00 pm

of the

**One Week Online Faculty Development Programme**  
on

**Significance of Vedic Mathematics in Modern Era**

Organized in collaboration with

**Shiksha Sanskriti Utthan Nyas (SSUN)**  
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(A Centre of MoE under PMMMNMTT Scheme)

**Hansraj College**  
(NAAC A+ CGPA 3.62, NIRF Rank #14)  
University of Delhi



**Dr. Vikas Gupta**  
Registrar  
University of Delhi  
(Chief Guest)



**Prof. V. Ravichandran**  
Dept. of Mathematics  
NIT, Tiruchirappalli  
(Guest of Honour)



**Ms. Upasna Agarwal**  
Coordinator, SSUN,  
New Delhi



**Shriram Chauthaiwale**,  
All India convener, Vedic Ganit,  
Shiksha Nyas, New Delhi



**Prof. Manoj Sinha**  
Principal & Patron,  
Aryabhata College



**Dr. Naveen Kumar Jain**  
Convener, Aryabhata College



**Dr. Chandrashekhar Nishad**  
Coordinator, Aryabhata College

# SCHEDULE



**Schedule for one-week online FDP**

**on**

**Significance of Vedic Mathematics in Modern Era  
(December 5-10, 2022)**



DAY	Session – I Time – 09:30 am to 11:00 am	Session – II Time – 11:30 am to 01:00 pm	DATE
1	<b>Inaugural Session (9:00 am-11:00 am)</b> <b>Chief Guest:</b> Prof. Nageshwar Rao Vice Chancellor IGNOU <b>Guest of Honour:</b> Prof. Balaram Pani Dean of Colleges University of Delhi <b>Speaker:</b> Dr. Gajendra Pratap Singh Assistant Professor, JNU	<b>Sri Deepak Vashitha</b>  Arithmetic application of Sutras in Vedic Ganit	05/12/2022
2	<b>Dr Rakesh Bhatia</b>  Sutras of Vedic Ganit and Biography of swami Bharti Krishna Tirtha ji	<b>Dr Kailash Vishwakarma</b>  Ganit in Vedas and Vedic literatures	06/12/2022
3	<b>Dr Anuradha Gupta</b>  Algebraic Equations in Vedic Ganit	<b>Dr Komal Asrani</b> Role of number system in Computer Science and Vedic Ganit	07/12/2022
4	<b>Dr Sri Ram Chauthaiwale</b>  Use of Vedic Ganit sutras in Geometry	<b>Sri Anil Kumar Thakur</b>  Cryptography in Vedic Ganit	08/12/2022
5	<b>Dr Anuradha Gupta</b>  Divisibility by positive and negative oscillator	<b>Dr Kailash Vishwakarma</b>  Future applications of Vedic Ganit in various spheres of life	09/12/2022
6	<b>Assessment</b>	<b>Valedictory Session</b>	10/12/2022

## Day I

### Inaugural Session

The FDP on *Significance of Vedic Maths in Modern Era* was started with an inaugural session on 5<sup>th</sup> December 2022 at 9:30 a.m. Guest of Honour Prof. Balram Pani, Dean of Colleges, University of Delhi and Chief Guest Prof Nagesh Rao, Vice Chancellor, IGNOU along with Prof Sinha witnessed the lighting of the digital lamp followed by Saraswati Vandana. The Principal, Aryabhatta College welcomed the guests, he also appreciated and welcomed the collaborating partners Prof. Rama Sharma, Principal Hansraj College and Dr. Upasana Agarwal from Siksha Sanskriti Utthan Nyas. Prof. Sinha in his welcome speech mentioned the relationship of Aryabhatta to Mathematics of the ancient era and expressed pride in the college being his namesake. Prof. Rao talked about the various states and cities where Vedic maths courses are being run. He also highlighted that NEP focuses on regenerating the interest of youth in the Indian traditional knowledge. He pointed out that SSUN has played a crucial role in extending their assistance to anyone and everyone who is receptive in starting a course of this nature. In certain instances, SSUN provides assistance if starting courses free of cost as well. Prof. Balram Pani, mentioned that Mathematics has been very close to Indians for ages because Indians understood the crucial role its application abilities can play in one's growth. He says it is the mathematical abilities that Indians are known for at international level therefore his congratulatory wishes were extended to Aryabhatta College for the course. On that note the first technical session began.

The FDP had total of 10 sessions by 7 experts, they were as follows:

1. Mr. Deepak Vashishta, Lecturer in Mathematics, Govt Model Sanskriti Sr Sec School, Faridabad.
2. Dr. Anuradha Gupta, Associate Professor, Delhi College of Arts & Commerce (University of Delhi).
3. Dr. Kailash Vishwakarma, Associate Professor and Head, Physics Department, BNPG College Rath Hamirpur, Uttar Pradesh.
4. Sh. Anil Kumar Thakur, Vedic Ganit Expert, SSUN.
5. Dr. Shriram Chauthaiwale, Retd. Lecturer, Amolakchand College, Amravati University, Maharashtra.
6. Dr. Rakesh Bhatia, Vedic Mathematics Expert, Board of School Education, Haryana.
7. Dr. Komal Asrani, Professor, Dept of Engineering and Computer Science, Babu Banarasidas Northern Indian institute of Technology, Lucknow, U.P.





## Session I

The first technical session was hosted by guest speaker Dr Gajendra Pratap Singh, Asst. Professor, School of Computational and Integrative Sciences, JNU and he talked about Pingala number system vs modern binary number system.

He tried to correlate the Pingala's number system with modern binary number system. He said that reducing gap between modern and ancient system is crucial to understanding the concepts. Pingala was an ancient Sanskrit scholar born in 2<sup>nd</sup> or 3<sup>rd</sup> century B. C. His works were Chanda Shastra that dealt with science of meters. It is the earliest known treatise on prosody. Very little is known of his biographical history while the work is retained till date. His work involved binary system in listing vedic meters with short and long syllables. His work contains the basic ideas of *Maatraameru* and *Meruprastaara*, known as Fibonacci number and Pascal's triangle in the modern era. In the context of syllable (*Chandas*), it may be a letter or letters. Accordingly, it may be a vowel or vowel with consonant. A syllable may be Heavy (*Guru*) or Light (*Laghu*) depending upon such vowel consonant combination. *Guru* is assigned for long syllable *Laghu* is assigned for short syllable. Where long syllable is for 1 and short syllable is for 0. His system of binary systems starts with 1. The numerical value is obtained by adding one to the sum of place values. In Pingala's system the place value increases to the right while modern binary system it increases towards left. Similarly, he goes on to draw parallel between the modern binary system and Pingala's number system to each of its component and mechanism. The session ended with questions from participants.

## Day I

### Session II

The second technical session was conducted by Dr. Deepak Vashishta. His topic of discussion was titled as "**Application of Vedic Sutra in Arithmetic**". He started his session by paying his respect to the Father of Vedic Mathematics, Jagat Guru Shankracharya Swami Bharti Krishna Tirtha ji Maharaj. He also mentioned that Maharaj is credited with explaining concepts of entire mathematics with just 16 *Sutras* and 13 *Up-Sutras*. He asserted that even the modern mathematics basically uses the same *Sutra* and *subSutra* but has more complicated anglicised names.

*Nikhilam Sutra* is Base Method in Vedic mathematics has a strong relationship with algebra. *Nikhilam Sutra* is used for multiplication of number closer to the base 10 and its powers are called base in Vedic Mathematics. There are three cases that arise: a) numbers above to base, b) number below the base and c) one above number above. While there is a concept of deviation, that is base minus number. The formula reduces the multiplication to single line calculation no matter the size of the digits.

*Ekanyunena Purvena Sutra* comes as a sub-*Sutra* to *Nikhilam* which gives the meaning 'One less than the previous' or 'One less than the one before'. *Ekanyunena Sutra* is useful in Recurring Decimals. Divide the multiplicand off by a vertical line into a right-hand portion consisting of as many digits as the multiplier; and subtract from the multiplicand one more than the whole excess portion on the left. This gives us the left-hand side portion of the product or take the *Ekanyuna* and subtract it from the previous i.e., the excess portion on the left and subtract the right-hand side part of the multiplicand by the *Nikhilam* rule

*Antyayor Dashkepi Sutra* says that it be used where ever the sum of the last digits is 10 and remaining digits are the same. The *Sutra* signifies numbers of which the last digits added up

give 10. i.e., the *Sutra* works in multiplication of numbers. In each case the sum of the last digit of first number to the last digit of second number is 10. Further the portion of digits or numbers left wards to the last digits remain the same. At that instant use *Ekadhikena* on left hand side digits. Multiplication of the last digits gives the right-hand part of the answer.

*Urdhwa Tiryagbhyam Sutra* (Vertically and Cross wise) it is a multiplication between equal number of digits in a problem. It is a general method of multiplication. Unlike the above methods this method does not have a condition. One multiplies vertically the digits to get the left and right part of the solution while the sum of crosswise multiplication gets one middle part. All solutions arranged in their respective order gets one the answer.

He also elaborated how the same *Sutras* can be used to find out the square roots. *Ekadhikena* method is conditional method meaning “one more than the previous one”. The simplest form includes 5 at the end. Right side includes 25 while left side is sum total of first digit multiplied by one less of the first digit. The second method for square root is *Yavdunam*. It is used for finding out square-root of 10, here again deviation is important. Formula for this *Sutra* is “Base+2(deviation) and the last digit is deviation square”. The third method is *Dwandwa Yogah* or the Duplex Method, we multiply twice the digits in the problem.

He was elaborate and methodical in his lecture; he would patiently explain each method through examples. He concluded his session with question-answer session.

## Day II

### Session I

Dr. Anuradha Gupta, Associate Professor, Delhi College of Arts and Commerce, University of Delhi spoke on “**The Concept of Fractions**”. As it is part of the NEP value added course at Delhi University. She explained the concept of prime numbers (two divisors and itself), composite numbers (more than two divisors), co-prime numbers (has only one common divisor), digit 1 is neither prime nor composite because it has only one divisor that digit 1 itself.

She went on to explain partial fraction in the need to integrate in a mathematical problem. Partial fractions consume time wherein Vedic Maths makes it simpler.

In algebraic equations also Vedic Maths helps a learner to simplify equations. *Parvatya Yojayet* (Transpose and Apply) method requires one to find the value of  $X$  by using the formula  $X = \frac{a-b}{a-c}$  in an equation that is categorised as:

- Type 1 of the form  $ax + b = cx + d$ .
- Type 2 of the form  $(x + p)(x + q) = (x + r)(x + s)$
- Type 3(cross multiply) of the form  $(ax + b)/(cx + d) = p/q$
- Type 4 of the form  $\frac{m}{x+a} + \frac{n}{x+b} = 0$

She moved on in her lecture to explain the concept of *Sutra* “*Shunyam samayasamuchchaya*”, literally meaning “when the collectivity is same that collectively zero”. Amongst many some examples were of the type

- Sum of Numerators = Sum of Denominators
- Sum of Denominators is equal on both the sides
- Sum of the bases on both sides are equal
- Numerator 1 + Denominator 1 = Numerator 2 + Denominator 2
- Quadratic form of the type  $ax^2 + bx + c$
- $y + \frac{1}{y} = \text{constant}$

She concluded the session with question answer session and offered to assist the participants in future if need be. The speaker was thanked by Dr. Chandrashekhar Nishad.

## Day II

### Session II

Dr. Kailash Vishwakarma, Department of Physics, Bhrahmanand Post Graduate College Hamirpur, U.P. spoke on the topic “**Ved and Vedic Literature in Maths**”. He started his lecture with the first shloka of the Rigveda that describes about features of Agni through Maxmuller’s voice recording on the first gramophone by Thomas Edison. He further



elaborates on *Vedi Vagmaya* through a *Shloka* specifying that books of all religion must be held close to heart. These books of knowledge are called *Gyannidhi* in Vedas. He moves onto quote Dayanand Saraswati who advocated the study of Vedas for Mathematics and Sciences. He in his lecture referred to a text called *Shabda Veda*. He says that each Veda has *Aranyak*, *Brahman*, *Shakhayaein*, *Shloka Sutra*, *SulvaSutra*. *Vedang* on the other hand is *Chhanda*, *Vyakaran*, *Kalpa*, *Jyotish*, *Siksha*, *Nirukta* all needs to be studies to understand Veda in their full capacity.

About Maths Vedas says that it's like a jewel in the crown, knowledge here is the crown. In this everyday life there is no existence without maths, singing, dancing or any other art form all requires maths. 108 *Upanishads* mention maths and its importance. In 18 *Puranas* require maths even to remember the names and order of the Puranas. He upraised the audiences that the text for Geometry is *SulvaSutra*. The *SulvaSutra* are further divided into sections based on their time line:

- *Baudhayana* 800BC
- *Apastamba* 600BC
- *Katyayana* 200BC
- *Manava* 750 BC
- *Maitrayana* 200BC
- *Varah* 300BC
- *Vadhula* 800BC
- *Hiranyakeshi* 300BC

These are also used in creating the fire pit for *Yajnas* rituals. Hence, rituals of the Vedic era were mathematically arranged to align with the Universal Cosmic order. The *Yajna Vedi* created on the floor are called *chiti* and are created in multiple shapes- square, rectangle, circular, turtle shape all have odd and even formations based on mathematical calculations.

*Yajurveda* mentions terms for digits such as: Zero or *shunya* is described also as *om*, *brahma* etc. signifying that the universe is created my adding digits to 0, therefore, referring to addition and subtraction. *Atharveda* mentions digits up to 10 through shloka where 10 is the base hence reference to decimal. The shloka mentions that multiplication and division is how everything is created. Vedas also mentions the place value system. He says that Vedas mentions the whole world is one family. He further elaborated in detail the different concepts of mathematics for calculations through shlokas. Fractions, infinity related calculus concepts all have dedicated section. These were repeated during the rituals and yajnas. To assert his point, he quoted Ramanujan, "An equation for me has no meaning unless it expresses a thought of God".

The Vedas also teaching counting through body part and other natural physical formations, 2 for eyes, 5 senses, 7 seas etc... 0-9 is covered via physical indicators in human body or immediate physical surroundings. Value of Pi and its calculations can also be traced through shlokas. The third *Sanhita* of the mention nakshatra and its master, we also find names of 12 months in Vedas making it possible to calculate time.

The session followed question answer session followed by thank you note by Dr. Chandrashekhar Nishad

## Day III

### Session I

Dr. Anuradha Gupta, Associate Professor, Delhi College of Arts and Commerce, University of Delhi devoted her lecture on the “**The concept of Division as presented in Veda**”. She used the *Vestnaji SubSutra* where is elaborated on positive and Negative osculations. She used (*P*) for positive osculation and (*Q*) for negative osculations. For negative osculation she used *Ekadhiken Purvan* (one more than the previous one) for positive osculation and *Eknyum Purvan* (one less than the previous one). She elaborated that the addition of 1 is applicable only when divisor is ending in 9, while *Eknyum Purvan* or minus 1 is used when divisor is ending in 1. Rules for positive and negative osculation for the divisors ending with 9,3,7 and 1 were discussed in detail along with their relationship with the divisors viz.  $P + Q = \text{divisor}$ .

After discussing the osculations its applications were discussed by taking different questions of divisibility, common method for divisibility of 7, 11, 13 were discussed. General rule of divisibility by 3,33,333, 10,101,1001 etc including divisibility with even divisors (2,4,6,8. . .) were elaborated using the *Sopantya Dwayamat* (Ultimate and twice the penalty mate) *sutra*.

She gave important suggestions regarding relevant readings to refer to in case of further learning is initiated. The session followed the question answer session and thank you note by Dr. Chandrashekhar Nishad.

## Day III

### Session II

This technical session was presided by Dr. Komal Asrani, Professor, Dept of Engg. and Computer science, Babu Banarasidas Northern Indian institute of Technology, Lucknow, U.P. she spoke on the “**Relevance of Number System in Computer Science and Vedic Mathematics**”. She lectures focussed on two aspects, i.e., Vedic maths and computer science and correlation between the two. Vedic Maths are based on rules called *Sutras* and Sub-*Sutras* used to solve problems.

She started her discussion with elaboration of number system in computer science. Writing a code or a program tackles the hurdle of making computer understand the requirement. Human language is not understood by computers, it understands its own native language i.e., Binary.

There are variety of number systems and their usages were discussed like the

1. Binary number system works on two base numbers i.e., 0/1, where 0 refers to false and 1 for true.
2. Octal Number system which has base 8.
3. Decimal Number system which uses 0-9.
4. Hexa-Decimal Number system which has base is 16.

Contribution of Indian Mathematicians

All the concepts relate to Vedas. And all concepts are expressed in *chhandas*. These *chhandas* are arranged in *paddhat*. Veda refers to values as high as  $10^{20}$ . The decimal system talks about 10 dimensions. In vedic origin too we find 10 dimensions and are quoted as space which denotes 3 directions (length, breadth and height= Longitude, latitude and height). The

4<sup>th</sup> dimensioned is referred to as fourth-head of Brahma, 5<sup>th</sup> dimension is Mahakal is time, 6<sup>th</sup> dimension is consciousness(*chetna*), 7<sup>th</sup> Dimension is Rasi- medium to link elements. 8<sup>th</sup> dimension is Naga defines curling effect through which every object defines its own local field. 9<sup>th</sup> Dimension is *Nanda* ie deficiency, 10<sup>th</sup> Element is *anand*, highest stage of consciousness. So, the Vedas not only explain the dimensions or elements of decimal system, it not only explains mathematical concepts, it also relates to spiritual alignment.

Pingala – worked on concept of Number system called *Chhanda Shastra*. Specially on the concept of 0 & 1, his work was extended on by *Kedara*, *Trivikma*, *Halayudha*. They worked in 8, 12 and 13<sup>th</sup> century respectively. Almost replicating the Binary Numbers. But Pingala's binary representation started with 1 and went from left to right, the modern Binary system works from right to left and starts with 0. She also elaborated on conversion of decimal value into binary. The *Sutra* that is used for conversion of Decimal into Binary is *Shesanyankena Chama* that literally translates to Remainder by the last Digit. It is the same as the modern mathematical rule. Vinculum is used to convert bigger values into smaller ones in the decimal system. The *Sutras* used for Vinculum are *Nikhilam Navascharman Dashtah* and *Ekadhikena Purvena*. *Devinculum* is used for converting binary into decimal and can be done with the help of vedic formulae. She also elaborated on the multiplication techniques touched upon by Dr. Vashishtha.

## Day IV

### Session I

Dr. Shriram Chauthaiwale, Asst Prof. Amravati University, Maharashtra. He is also the all-India convener of Siksha Sanskriti Utthan Nyas. His lecture was titled “**Use of Vedic Ganit Sutras in Trigonometry**”. He started with an assertion that we all know that India has had great contribution in the field of basic mathematics and number system. Geometry is also exhausted to build *vedi*, *chhiti*, *Yajna shala*. On the account of Trigonometry, in Vedic Document Trigonometry is called as *Jyotpatti Ganita* literally translating to science of calculation for construction of the Sine. *Jya* (Sine), *Utpatti* (construction. generating). Recently rechristening of Trigonometry led to modern name called *Trikonomiti*, which is phonetically closer to Greek name trigonometry.

The earliest reference is found in *Suryasiddhanta* followed by works of Aryabhatta in 5<sup>th</sup> century, *Varahamihira* in 6<sup>th</sup> century, *Bharhmagupta* in 7<sup>th</sup> century and Lalla in 8<sup>th</sup> Century. The subject was further developed by *Kamalkara* in 17<sup>th</sup> century, *Madhava* in 14<sup>th</sup> century and other scholars contributed in *Tantrasangraha* in 15<sup>th</sup> century. One also finds elaborations in *Yuktibhasha* of 16<sup>th</sup> century. One of the contributions of India to world of mathematics in the invention of trigonometry function were *jya*(Sine), *koti-jya*(Cosine) and *Utkram-jya* (Versed Sine). Formulae available in the text that has been proved and applied were

- $\sin A = \cos(90 - A)$
- $\sin^2 A + \cos^2 A = 1$
- $\sin 45^\circ = \frac{1}{\sqrt{2}}, \sin 30^\circ = \frac{1}{2}$

which are mentioned in Bhaskar's *Jyotpatti*.

Also, Verse 21 and 22 gives formulae which are used nowadays like

- $\sin(\alpha \pm \beta) = \sin\alpha \cos\beta \pm \cos\alpha \sin\beta.$
- $\cos(\alpha + \beta) = \cos\alpha \cos\beta - \sin\alpha \sin\beta.$
- $\sin \theta = 2\sin\theta \cos \theta.$
- $\cos 2\theta = 1 - 2\sin^2 \theta$
- $1 - \cos \theta = 2\sin^2 \left(\frac{\theta}{2}\right)$
- $1 + \cos \theta = 2\cos^2 \left(\frac{\theta}{2}\right)$

Bhaskara's computation gives vales of all Sin values that matches with the modern values, the accuracy is correct upto 5 decimal values.

VM Method: *Baudhayana* Numbers- Triplets mentioned in Swami Krishna Bharati mentions in his diaries. The method he suggests is *Tribhujanga* is defined as:

- A set of three real numbers  $x, y, z$  satisfying the equation  $x^2 + y^2 = z^2$  is represented with a right-angle triangle. Every *Baudhayana* triplet associated with angle  $A$  opposite to side  $y$  is  $T(A) = [x, y, z]$ ,  $T(B) = [y, x, z]$

Value of the triplet according to quadrants, *Baudhayana* triplet for sum of two angles, trigonometrical ratios were also discussed.

## Day IV

### Session II

Sri Anil Kumar Thakur from Siksha Sanskriti Utthan Nyas topic of discussion was “Cryptography in Vedic Ganit”. He talked of the hidden symbolism in the vedic writing. Cryptography, therefore is a method of Protecting Information and communication through the use of codes so that only those for whom information is intended can read and process it. The application of cryptography is done for cybersecurity, Cryptocurrencies and cryptoeconomics, computer passwords, electronic signatures, end to end encryption.

The most scientific and rich vocabulary to be used for encryption is Sanskrit and Hindi are best suited. Then Vedic knowledge presents cryptography in the 4 up-*Sutra* of Swami Bharti Krishna Tirthaji texts. The *Sutra* is called *Kvalai: Saptak Gunayat*. The source of Cryptography *Kutankan* in Vedic literature is presented through the shlokas. The Vedas include all 4 Vedas, 18 puranas, 108 *Upanishadas*, *Ramayana*, *Gita*, *Jaina* and *Buddhist* literature, *Guru Granth Sahib*. Examples of cryptography is present in all of these texts along with other mathematicians of ancient Indian origin. Initially in language expression was only in oral form that had special expression of vowels, consonants and words in Devanagari script later when writing starts. Encoding was used by astrologers, mathematicians, astronomers and mystics in space.

As far as types of coding is concerned then there were multiple mediums

- Encoding through words (*shabda Kutankan*)
- Encoding through consonants (*vyanjan Kutankan*)
- Encoding through Character (*Varna Kutankan*)
- Encoding through Divya (*Divya Kutankan*)

in each of these mediums the mediums and their variation represent a number the methods are hence called *Kutank*.

- 0 is represented by words like *shunya*, *purna*, *viyat*, *akash*, *nabh*, *gagan* etc
- 1 is represented by *ek*, *roop*, *Prithvi*, and its synonyms
- 2 is represented by *dwo*, *yugal*, *yugam*, *yut*, *netra* and its synonyms
- 3 is represented by *trini*, *lok*, *ram*, *gun*, *kram*, *shivnetra*, *Madhya*, fire and its synonyms
- 4 is represented by *chavari*, *yug*, *ved*, *shruti*, *ashtka*, *pratishtha*, *sea* and its synonym
- 5 is represented by *panch*, *pran*, *indruya*, *tatva*, *bhut*, *arrow* and its synonym
- 6 is represented by *shat*, *ras*, *anga*, *ritu*, *unshail*, *atarva*, *tark*, *shatru*- enemy and its synonym
- 7 is represented by *sapta*, *swar*, *adri*, *rishi*, *muni*, *ashva*-horse and its synonym, *shail*-mountain and its synonym
- 8 is represented by *ashta*, *vasu*, *gaj*- elephant and its synonym, *dwija*, *anushtam*
- 9 is represented by *nav*, *nand*, *anka*, *gav*, *khechar*, *chhidra*- hole and its synonym
- 10 is represented by *das*, *pankti*, *disha*-directions *ans* its synonym

And so on till it reaches the value of 21600.

The coding also covers half, one third, quarter etc.

Application of Pi and its value is also presented by Bhaskaracharya in the 12<sup>th</sup> century and he used it to represent large numbers in his book and to conduct trigonometric calculations.

Wherein each word and letter of each word hid in it trigonometric and other mathematical formulae. His work Lilavati is the finest example of such coded mathematical concepts. In this text he covers area of circle, surface of sphere, volume of sphere.

Other important scholar is Narayan Pandit who presents in coded *shloka* format calculations, so does Goswami Tulsi Das. They could calculations, hide formulas, mention dates through use of words denoting numbers. Consonant coding is called *Katapayadi Sutra* where consonants present numbers. Devnagari alphabets then represent numbers: *Ka*=1, *Kh*=2, *Ga*=3 so on and so forth. And the same then is used to denote digits in *shloka* formed formulae and calculations. They were most useful in recurring decimal functions. *Rigveda* too mentions value of *Pi*.

Character Coding on the other hand, where vowels represent decimal number while “*ya*” and “*ha*” represents multiples of 100. Aryabhatta Uses similar coding to decode the number of planets. Their distance etc. they calculate even the distance of sun and moon in similar format. On that note he concluded his session followed by question answer session.

## Day V

### Session I

Dr. Rakesh Bhatia began the session by first enquiring from the participants regarding their experience in the ongoing FDP till now so as to gauge their understanding regarding the subject so that he can move ahead with his lecture. He discussed about the father of Vedic mathematics Bharati Krishna Tirtha ji and his diary. There are many lessons in the book like actual application of Vedic *Sutras*, arithmetical computations, division by *Nikhilam* and *Pravartaya* method, factorisation of quadratics and others. He further discussed the literature of Vedic Mathematics in Metaphysics (1978), literature by Kansara, finding the squares using *Sutra Dwandvayoga*, application in trigonometry like finding various trigonometric ratios and different identities. He then again enquired the audience participants to express their views regarding the subject and how the subject of Vedic mathematics has an edge over the other conventional methods. The session concluded with the vote of thanks by Dr. Chandrashekhar Nishad.

## Day V

### Session II

Dr. Kailash Vishwakarma, Department of Physics, Bhrahmanand Post Graduate College Hamirpur, U.P. spoke on the topic “**Future applications of Vedic Ganit in various spheres of life**”. Dr. Vishwakarma in continuation to his previous lectures also discussed the following topics:

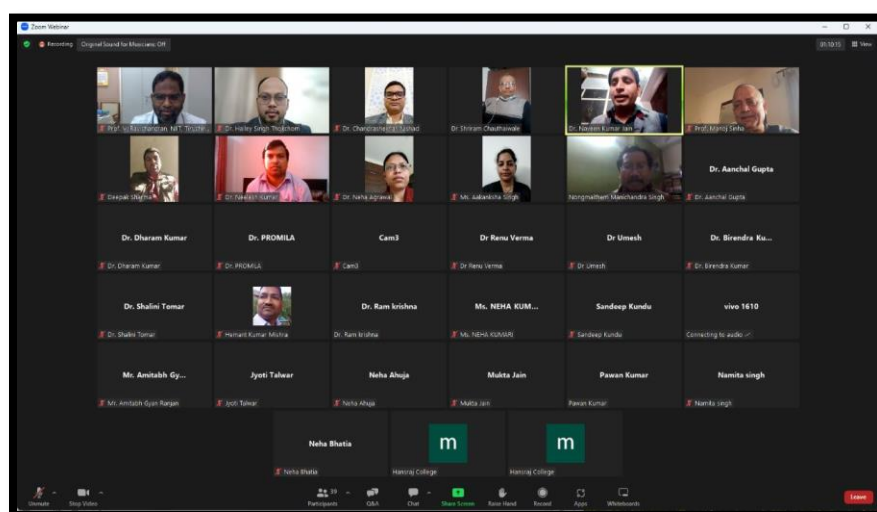
- How to find square of a number using different methods like *Anurupyena*, *Yavadunam tavadunikritya vargam cha yojayet*, *Ekadhikena Purvena*, *Ekanyunena Purvena*, *Sankalanvyavakalanabhyam*.
- Finding the fifth root using *Vilokanam* methodology.
- Multiplication using the concept of base numbers and deviation.
- Divisibility using the *Ekadhikena Purvena* method.
- Hexadecimal number system (multiplication of two numbers and three, 4 numbers and mixed multiplication Different powers of numbers like square cube and fourth power and divisibility, recurring decimals.
- *Meru Prastar* and its properties like shape, row sum and its applications like power of digits, arithmetic, algebra, calculus, digital electronics, trigonometry, n-dimensional space.
- Generation of *Baudhayana* numbers for n-dimensional space when number of variables is known.

He concluded by various books recommendations for Vedic Mathematics. The session ended with Q-n-A sessions and vote of thanks by Dr. Naveen Kr. Jain



## Valedictory

Dr. Naveen Kr. Jain conducted the valedictory session for the week-long workshop on Vedic maths. The day saw the presence of Chief Guest Dr. Vikas Gupta, Registrar, University of Delhi, Guest of honour Prof. V. Ravichandran, former HOD, Department of Mathematics, University of Delhi and amongst special guests were Mr. Sriram Chauthaiwala and Ms. Upasana Agarwal from Siksha Utthan Nyas, New Delhi. Principal Prof. Manoj Sinha welcomed the guests and thanked the organising team of Aryabhata College and collaborators for successful FDP. He pointed out that Aryabhata college is dedicated towards encouraging research related to traditional Indian knowledge system. He also said that this FDP will help future students as the faculty training is crucial to dispensation of knowledge. Dr. Vikas Gupta, Registrar, D.U. addressed the house and he expressed his delight over Aryabhata College initiative in retrieving the Indian tradition and unearthing the knowledge traditions located in the wisdom of the ancient scholars. He said it is time we shared our knowledge packaged in new era with the west but the journey shall start at home. Prof. Ravichandran mentioned that Indian system believed in holistic growth and development. The villages still hold close the Indian traditional knowledge through the rituals. He said traditions hold a lot of lost knowledge and hence must be preserved. He said mathematics in ancient traditions was part of life and not only a concern for the scholars and academicians. Mr. Chauthaiwala elaborated on *Sutras* of Vedic Maths. He also elaborated on the importance of logic and rational thinking of the saints like Shankaracharya. At last, the participants expressed their personal experience and relevance of the course conducted for the faculties.



# PHOTO GALLERY

## DAY-1

**Pingala Number System Vs Modern Binary Number System**

Gajendra Pratap Singh

MathSciNet-Lab  
School of Computational and Integrative Sciences  
Jawaharlal Nehru University  
New Delhi-110067, India  
gajendra@mail.jnu.ac.in

December 5, 2022

**Bhagwan Rama Ancestors**

Highlights of Surya Vamsha and Chandra Vamsha

This proves that Graph Theory is already embedded in Sanskrit Literature.  
The only things is that we need to work together to integrate the

**FATHER OF VEDIC MATHEMATICS**

Jagadguru Shankaracharya Swami Bharti Krishna Tirth ji Maharaj

**MIXED PROBLEMS.**

1.  $12 \times 13 + 14 \times 16 = 3530 = 380$   
Left = Base + D<sub>1</sub> + D<sub>2</sub> =  $10 + 2 + 3 + 10 + 4 + 6$   
Right =  $6 + 24 = 30$

2.  $104 \times 106 + 103 \times 107 = 22045$   
Left - Right  
S<sub>1</sub> =  $12 + 2 = 14$   
S<sub>2</sub> =  $140 + 11 + 8 = 159$   
S<sub>3</sub> =  $15$

3.  $32 \times 41 + 12 \times 24 =$



## DAY-2

10:35 AM Tue 6 Dec

✓

1/1

Type 6

$$(x-2)^3 + (x-6)^3 = 2(x-4)^3$$

$$\frac{x-2 + (x-6)}{2(x-4)} = \frac{2x-8}{2(x-4)}$$

$$2x-8 = 0 \Rightarrow x = 4$$


---


$$(x+5)^3 + (x+3)^3 = 2(x+4)^3$$

$$2x+8 =$$

Anuradha Gupta



वेद एवं वैदिक साहित्य में गणित

दादश प्रपञ्चकमेक नीति न्यायि क उ तजिवले ।  
तस्मिन्मूलक विज्ञान न राजकोटिः सति उताप्रसवः ॥  
(ऋग्वेद/मण्डल 1 / सूक्त 164 / मंत्र 48)

दादश नहि तज्जयं वर्तते चकं परि पाकृत्य ।  
आ पुत्रा अग्ने विष्णुः अत्र सप्तमत्तानि विस्तारिष्य तस्य ॥  
(ऋग्वेद/मण्डल 1 / सूक्त 164 / मंत्र 11)

दादश प्रपञ्चकमेक नीति न्यायि क उ तजिवले ।  
तत्राहः नीति शतानि शक्ये षट्द्विष्वक्ता अविच्यवता ये ॥  
(अथर्ववेद / काण्ड 10 / सूक्त 8 / मंत्र 4)

1:05:19

You are viewing Dr. Kailash Vishwakarma's screen

Dr. Chandrashek... Dr. Kailash Vish... m

Dr. Naveen Kumar Jain Dr. Kailash Vishwakarma Dr. Chandrashekhar ... Dr. Kailash Vishwakar Hansraj College

3 Hexadecimal - Microsoft PowerPoint

विभाजनीयता (Divisibility)

• एकाधिकेन पूर्वेण विधि (Ekadhikena Purvena Method):  
उदाहरण  $X = 16$ , नाज्य = 1 AB 45 AB 00 4231, नाजक = 2 FFFF,  
प्राचल =  $2FFFF + 1 = 30000$  अर्थात् 3, शून्यों की संख्या = 4

संख्या	1	AB45	AB00	4231
FFFF x 3 + 1 + 1	7193x3 + 1 + AB45	4231x3 + AB00	4231	
द्वितीय 2FFFF	1FFFF	17193	4231	
FFFF	FFFF	7193	4231	
0000	0000	8E6C	BDCF	

संख्या विभाजित होती है एवं भागफल 8E6CBDCF है।

**Vaidik Ganit and its Applications**

Kailash Vishwakarma: BHPS College Raigarh, UP 244847

### DAY-3

10:25 AM Wed 7 Dec

Divisibility with even divisors  
divisors are ending in 2, 4, 6, 8 etc

Sutra Sopantyadyayanant -  
Ullimati & twice the penultimate

Rule ① 8, 18, 28, 38, 48 - - -  
P → 1, 2, 3, 4, 5 - - - ③ ending in 4

② 6, 16, 26, 36 - - - x3  
18, 48, - - -





Relevance of Number System in Computer Science 12/7/22  
and Vaidik Ganit

Number System  $\rightarrow$  Computer Science

Human language eg for (1.0, 1.5) )  
do, while, stop - - -

Computer  $\rightarrow$  Binary

Dr. Komal Asrani

## DAY-4

# Use of Vedic Ganit Sutras Trigonometry

Dr Shriram Chauthaiwale

Thursday 8 Dec 2022



Activate Windows  
Go to Settings to activate Windows.

Show that  $3 \tan^{-1} \left( \frac{1}{2} \right) = \tan^{-1} \left( \frac{11}{2} \right)$ .



- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>• Let <math>A = \tan^{-1} \left( \frac{1}{2} \right)</math>.</li> <li>• Then, <math>\tan A = \frac{1}{2}</math></li> <li>• <math>T(A) = [2, 1, \sqrt{5}]</math></li> <li>• <math>T(2A) = [3, 4, 5]</math></li> <li>• <math>T(3A) = [6 - 4, 3 + 8, 5\sqrt{5}]</math></li> <li>• <math>= [2, 11, 5\sqrt{5}]</math>.</li> </ul> | <ul style="list-style-type: none"> <li>• <math>\tan 3A = \frac{11}{2}</math></li> <li>• <math>3A = \tan^{-1} \left( \frac{11}{2} \right)</math></li> <li>• <math>3 \tan^{-1} \left( \frac{1}{2} \right) = \tan^{-1} \left( \frac{11}{2} \right)</math>.</li> </ul> |
|---|--|

**Cryptography in Vedic Ganit**

**4<sup>th</sup> Up-Sutra**  
केवलैः सप्तकं गुण्यात्

0:27:09

Mr. Anil Kumar Thakur

**4 :-** चत्वारि, ययं, वेद, श्रुति, कृत, अष्टका, समुद्र (Sea) के नाम (सागर, अब्धि, जलयि, अम्बुधि, अणव,...), प्रतिष्ठा

**5 :-** पाँच, पाण, इन्द्रिय, तत्त्व, भूत, विषय, वाण (Arrow) के नाम (शर, इषु, सायक, अक्ष,...), अक्षि, अयं, सुपतिष्ठा

**6 :-** षट्, रस, अंग, कृत, ऊनशैल, अर्तव, तर्क, शत्रु (Enemy) के नाम (अरि, रिपु,...), गायत्री

**7 :-** सप्त, स्वर, अदि, कृषि, मनि, शैल (Mountain) के नाम (अचल, नग, कभत, गिरि, भूमित, भूधर, क्षमाधर,...), अश्व (Horse) के नाम (तुरग, हय, ...) उष्णिक्

Dr. Chandrashekhar



## DAY-5

**Future Applications of Vaidik Ganit  
in various Spheres of Life**

Kailash Vishwakarma  
Associate Professor  
BNPG College Rath, Hamirpur  
Uttar Pradesh, Bharat, 210431  
kailashrath@gmail.com

$$3435 = 3^3 + 4^4 + 3^3 + 5^5$$

Kailash Vishwakarma: BNPG College Rath, UP, BHARAT  
09-10-2022

**103**

"It is already becoming clearer that a chapter which has a western beginning will have to have an Bharatiya ending if it is not to end in the self-destruction of the human race... At this supremely dangerous moment in history the only way of salvation for mankind is the Bharatiya Way."

- Dr. Arnold Toynbee  
British Historian 1889-1975

**Vaidik Ganit and its Applications**

Kailash Vishwakarma: BNPG College Rath, UP, BHARAT  
09-10-2022

Click to add notes

Go to Settings to activate Windows.

**Literature by Kansara**

- Kansara evinced a great interest in tracing the location of the boxes containing the manuscript of the Vedic Mathematics in sixteen volumes.
- He also contacted in this regard to Gujarat Government and Gujarat Police Department. Kansara was amazed to encounter the techniques from ancient Indian mathematics which are simple as well as powerful. He has explained also in the research paper that manuscript by Swami Bharati Krishna Tirth ji have been sold out to German Scholar in Rs80,000 and its FIR is Gandhi Nagar

Click to add notes





**NUMBER OF PARTICIPANTS: 68**

**NUMBER OF PARTICIPANTS FROM ARYABHATTA COLLEGE:18**

**OUTSIDE ARYABHATTA COLLEGE: 50**