# Value Addition Course
# <u>Vedic Mathematics - I</u>

| Course Title and Code | Credits | Credit Distribution of the Course | | | Eligibility Criteria | Prerequisite of the Course |
|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical/Practice | | |
| Vedic Mathematics- I | 02 | 1 | 0 | 1 | Pass in Class 12th | NIL |

**Course Objectives:**

- Foster love for maths and remove its fear through Vedic Mathematics
- Enhance computation skills in students through Vedic Mathematics
- Develop logical and analytical thinking
- Promote joyful learning of mathematics
- Discuss the rich heritage of mathematical temper of Ancient India

**Learning Outcomes:**

- Overcome the fear of maths
- Improved critical thinking
- Familiarity with the mathematical underpinnings and techniques
- Ability to do basic maths faster and with ease.
- Appreciate the Mathematical advancements of Ancient India.

**Syllabus of *Vedic Mathematics - I***

| Unit I: Vedic Maths**- High Speed Addition and Subtraction** | Sessions/Lectures |
|---|---|
| <ul><li>Vedic Maths: History of Vedic Maths and its Features</li><li>Vedic Maths formulae: *Sutras* and *Upsutras*</li><li>Addition in Vedic Maths: Without carrying, Dot Method</li><li>Subtraction in Vedic Maths: *Nikhilam Navatashcaramam Dashatah* (All from 9 last from 10)</li><li>Fraction –Addition and Subtraction</li></ul> | **5** |
| Unit II: Vedic Math **- Miracle Multiplication and Excellent Division** | |

| | |
|---|---|
| • Multiplication in Vedic Maths: Base Method (any two numbers upto three digits)<br>• Multiplication by *Urdhva Tiryak Sutra*<br>• Miracle multiplication: Any three-digit number by series of 1's and 9's<br>• Division by *Urdhva Tiryak Sutra* (Vinculum method) | 4 |
| **Unit III: Vedic Maths-Lightening Squares and Rapid Cubes** | |
| • Squares of any two-digit numbers: Base method<br>• Square of numbers ending in 5: *Ekadhikena Purvena Sutra*<br>• Easy square roots: *Dwandwa Yoga* (duplex) *Sutra*<br>• Square root of 2: *Baudhayana Shulbasutra*<br>• Cubing: *Yavadunam Sutra* | 3 |
| **Unit IV: Vedic Maths-Enlighten Algebra and Geometry** | |
| • Factoring Quadratic equation: *Anurupyena, Adyamadyenantyamantya Sutra*<br>• Concept of *Baudhayana* (Pythagoras) Theorem<br>• Circling a square: *Baudhayana Shulbasutra*<br>• Concept of pi: *Baudhayana Shulbasutra*<br>• Concept angle ($\theta$) $0°$, $30°$, $45°$, $60°$ and $90°$: *Baudhayana* number | 3 |

*Note:* **Some of the theoretical concepts would be dealt with during practice hours.**

**Practical/ Practice Component**          **(15 sessions of 2 hours each= 30 hours)**

The students are expected to demonstrate the application of Vedic Maths: *Sutra* and *Upsutra*
- Conduct workshops under the supervision of the course teacher to spread awareness on the utility of Vedic Mathematics.
- Students are required to visit nearby retail shops/local vendors to purchase stationery/vegetables/bread and butter and use tricks of Vedic maths of addition and subtraction to calculate the amount to pay and receive the difference.
- Students may share their experience with the class teacher in the form of audio-video presentations of 15 minutes.
- If required, students can share their experiences in the form of a Project Report.
- Any other Practical/Practice as decided from time to time

**Essential Readings**
- The Essential of Vedic Mathematics, Rajesh Kumar Thakur, *Rupa Publications*, New Delhi 2019.
- Vedic Mathematics Made Easy, Dahaval Bathia, *Jaico Publishing*, New Delhi 2011
- Vedic Mathematics: Sixteen Simple Mathematical formulae from the Vedas, Jagadguru Swami Sri Bharati Krishna Trithaji, *Motilal Banarasidas,* New Delhi 2015.
- Learn Vedic Speed Mathematics Systematically, Chaitnaya A. Patil 2018.

**Suggested Readings**
- A Modern Introduction to Ancient Indian Mathematics, T S Bhanumurthy, Wiley Eastern Limited, New Delhi
- Enjoy Vedic Mathematics, S M Chauthaiwale, R Kollaru, The Art of Living, Bangalore
- Magical World of Mathematics, VG Unkalkar, Vandana publishers, Bangalore


**Assessment Methods***
Internal Assessment: 25%
End Semester Theory Exam: 25%
Practical: 50%
*Subject to directions from the Examination Branch/University of Delhi from time to time

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UNIVERSITY OF DELHI

# N O T I F I C A T I O N

## Sub:  Amendment to Ordinance V

Following addition be made to Appendix-II-A to the Ordinance V (2-A) of the Ordinances of the University;

**Add the following:**

**Value Addition Course (VACs)**
**Under UGCF-2022 listed under Appendix-II -A to the Ordinance V (2-A) of the Ordinances of the University**
**(With effect from academic year 2022-23)**

The following two courses are being added under the Pool of Value Addition Courses, which are in progression of the courses (i) Vedic Mathematics-I and (ii) National Cadet Corps-I respectively :

1. **Vedic Mathematics-II**
2. **National Cadet Corps-II**

## VAC :Vedic Mathematics - II

| Course Title and Code | Credits | Credit Distribution of the Course | | | Eligibility Criteria | Prerequisite of the Course |
|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical/Practice | | |
| Vedic Mathematics- II | 02 | 1 | 0 | 1 | Pass in Class 12th | VAC-Vedic Mathematics -I |

**Course Objectives:**

● Foster the love for mathematics by creating a positive attitude through Vedic and Ancient Indian Mathematics
● Help students appreciate ancient Indian Mathematics and its contribution to the world.
● Enhance computational proficiency by involving procedures in Linear and Matrix Algebra

- Improve geometrical thinking by understanding the basic tenets of geometry such as construction of line segments, angles, triangles and circles as used in Ancient India
- Develop conceptual knowledge of mathematical concepts
- Appreciate the need of conceptual knowledge over procedural processes

**Learning Outcomes:**

After completion of the course, students shall be able to
- think critically
- Find mathematical solution of algebraic expressions
- Solve system of linear equations and matrices faster and with ease.
- Appreciate the Mathematical advancements of Ancient India.

**Syllabus of *Vedic Mathematics - II***

| Unit I: Contribution of Indian Mathematicians | Sessions/Lectures |
|---|---|
| <ul><li>Varahmihir</li><li>Brahmagupta</li><li>Srinivasa Ramanujan</li><li>Neelkanth Somayya</li><li>Bharti Krishna Tirtha</li></ul> | 3 |
| Unit II: **Easy Solution of linear equations** | |
| <ul><li>Introduction of simple equation</li><li>Solutions of simple equations</li><li>Solutions of linear equations in two variables</li><li>Practical application of linear equations in two variables</li></ul> | 4 |
| Unit III: **High Speed Matrix Algebra** | |
| <ul><li>Introduction and history of Matrices and Determinants</li><li>Matrices and Determinants of third order</li><li>Inverse of Matrices</li></ul> | 4 |
| Unit IV: **Vedic Geometry** | |
| <ul><li>Different forms of straight lines</li><li>The Triangle</li><li>The Cyclic Quadrilateral, Squares, and the Circle</li><li>Geometrical constructions (such as *Altars*)</li><li>Transformation of simple shapes</li><li>Kalpa Sutras-*Srautha Sutras* and *Sulbha Sutras*</li></ul> | 4 |

*Note:* **Some of the theoretical concepts would be dealt with during practice hours.**
**Practical/ Practice Component          (15 sessions of 2 hours each= 30 hours)**

The students are expected to demonstrate the application of Vedic Maths through various *Sutras*
- Conduct workshops under the supervision of the course teacher to spread awareness on the utility of Vedic Mathematics.
- Students may share their experience with the class teacher in the form of audio-video presentations of 15 minutes.
- If required, students can share their experiences in the form of a Project Report.
- Any other Practical/Practice as decided from time to time

**Essential Readings**
- Vedic Mathematics, Swami Bharati Krishna Trithaji, *Motilal Banarsidas, New Delhi*.
- The Essential of Vedic Mathematics, Rajesh Kumar Thakur, *Rupa Publications, New Delhi*
- Vedic Mathematics For All Ages, Vandana Singhal, *Motilal Banarsidas Publishers.*
- Elements of Vedic Mathematics, Udayan S. Patankar, Sunil M. Patankar, TTU Press.
- Vedic Mathematics: The Problem Solver, Ronak Bajaj, *Black Rose Publications*.
- Vedic Geometry Course, S. K. Kapoor, *Lotus Press*
- Gardner, Robert and J.F. Staal. *Altar of Fire*. Documentary. The Film Study Center at Harvard University, 1976

**Suggested Readings**
- A Modern Introduction to Ancient Indian Mathematics, T S Bhanumurthy, *Wiley Eastern Limited, New Delhi*
- Magical World of Mathematics, VG Unkalkar, *Vandana publishers, Bangalore*
- Vedic Mathematics - Modern Research Methods, Tiwari P., *Cumpus Books International*
- Learning Vedic Mathematics, S. K. Kapoor, *Lotus Press Publications*
- Vedic Mathematics Made Easy, DahavalBathia, *Jaico Publishing, New Delhi*
- Vedic Mathematics New Horizons Advance Lessons, S. K. Kapoor, *Lotus Press*

**Examination scheme and mode: Subject to directions from the Examination Branch/University of Delhi from time to time.**

# Vedic Mathematics - III

| Course Title and Code | Credits | Credit Distribution of the Course | | | Eligibility Criteria | Prerequisite of the Course |
|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical/ Practice | | |
| Vedic Mathematics- III | 02 | 1 | 0 | 1 | Pass in Class 12th | Vedic Mathematics-II |

**Course Objectives:**

- Foster the love for mathematics by creating a positive attitude through Vedic and Ancient Indian Mathematics
- Help students appreciate ancient Indian Mathematics and its contribution to the world.
- Enhance conceptual as well as computational proficiency in trigonometric ratios and complex numbers
- Understand the conceptual ideas of coordinate geometry as developed and used in Ancient and medieval India
- Discuss the rich heritage of mathematical temperament of Ancient India

**Learning Outcomes:**

- Improved critical as well as logical thinking
- Familiarity with the mathematical procedures of geometry
- Ability to perform calculations in trigonometric ratios with ease.
- Appreciate the Mathematical advancements of Ancient India.

**Syllabus of *Vedic Mathematics - III***

| Unit I: Contribution of Indian Mathematicians -**Trigonometry** | Sessions/Lectures |
|---|---|
| • Baudhayana<br>• Apastamba<br>• Aryabhata I, II<br>• Bhaskara I, II<br>• Lilavati | 3 |
| Unit II: **Trigonometric Ratios** | |
| • Introduction of Trigonometric ratios<br>• Trigonometric Identities<br>• BN of Complementary angles<br>• BN of sum and difference $(\alpha \pm \beta)$ of an angle | 4 |
| Unit III: **Real-life Applications of Trigonometry** | |

| | |
|---|---|
| ●   Application Trigonometry-Height and Distance<br>●   Inverse Trigonometric Function | 3 |
| Unit IV: Vedic **Geometry** | |
| ●   Angle between two lines<br>●   Perpendicular distance from point to line<br>●   Baudhayan Geometry<br>●   *Jyothishya Shastram*-Introduction of Astronomy, Astrology & Time Computation<br>●   *Shilpa Shastram*- Introduction of temple architecture and constructions | 5 |

*Note:* **Some of the theoretical concepts would be dealt with during practice hours.**
**Practical/ Practice Component         (15 sessions of 2 hours each= 30 hours)**

The students are expected to demonstrate the application of Vedic Maths: *Sutra* and *Upsutra*
- Conduct workshops under the supervision of the course teacher to spread awareness on the utility of Vedic Mathematics.
- Students may share their experience with the class teacher in the form of audio-video presentations of 15 minutes.
- If required, students can share their experiences in the form of a Project Report.
- Any other Practical/Practice as decided from time to time

**Essential Readings**
- Vedic Mathematics, Swami Bharati Krishna Trithaji, *Motilal Banarsidas, New Delhi*.
- The Power of Vedic Mathematics with Trigonometry, *Atul Gupta, Jaico Publishing house*.
- Vedic Mathematics For All Ages, Vandana Singhal, *Motilal Banarsidas Publishers.*
- Studies in Indian Mathematics and Astronomy, Aditya Kolachana, K. Mahesh, K. Ramasubramanian, *Springer, Singapore*
- Elements of Vedic Mathematics, Udayan S. Patankar, Sunil M. Patankar, TTU Press.
- Vedic Mathematics: The Problem Solver, Ronak Bajaj, *Black Rose Publications*.
- Vedic Geometry Course, S. K. Kapoor, *Lotus Press*
- Gardner, Robert and J.F. Staal. *Altar of Fire*. Documentary. The Film Study Center at Harvard University, 1976

**Suggested Readings**
- A Modern Introduction to Ancient Indian Mathematics, T S Bhanumurthy, *Wiley Eastern Limited, New Delhi*
- Essential of Vedic Mathematics, Rajesh Kumar Thakur, *Rupa Publications, New Delhi*
- Vedic Mathematics - Modern Research Methods, Tiwari P., *Cumpus Books International*
- A Treatise on Astronomy By Bhaskaracharya, *Cosmo Publication.*
- Astronomical Applications of Vedic Mathematics, K. R. Williams, *Motilal Banarsidass Publishers, Delhi.*

**Assessment Method**
Subject to directions from the Examination Branch/University of Delhi from time to time

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# Value Addition Course
## Vedic Mathematics - IV

| Course Title and Code | Credits | Credit Distribution of the Course | | | Eligibility Criteria | Prerequisite of the Course |
|---|---|---|---|---|---|---|
| | | Lecture | Tutorial | Practical/ Practice | | |
| Vedic Mathematics- IV | 02 | 1 | 0 | 1 | Pass in Class 12th | Vedic Mathematics-III |

**Course Objectives:**

- Foster the love for mathematics by creating a positive attitude through Vedic and Ancient Indian Mathematics
- Enhance conceptual as well as reduce its fear through Vedic Mathematics
- Understand application of triangular array of numbers with *Meru Prastar*
- To become computational proficiency in differential and integral calculus
- Appreciate the rigour in mathematics conceptual understanding that existing in ancient India

**Learning Outcomes:**

- Improved critical as well as logical thinking
- Familiarity with the mathematical procedures of Pingala's *Meru* Prastar
- Ability to perform differentiation and integration of expressions faster with ease.
- Appreciate the Mathematical advancements of Ancient India.

**Syllabus of *Vedic Mathematics - IV***

| Unit I: Contribution of Indian Mathematicians | Sessions/Lectures |
|---|---|
| <ul><li>Pingala</li><li>Mahavira</li><li>Narayan Pandit</li><li>Jyesthadeva</li><li>Parmeshvaran</li><li>Madhavan</li></ul> | 3 |
| Unit II: **Wonder World of Indian Mathematics-*Meru Prastar*** | |
| <ul><li>Pingal's binary number system,</li><li>Different types of *Meru Prastar* (including Pascal triangle)</li><li>Applications of *Meru Prastar*</li></ul> | 4 |
| Unit III: **Lightening Complex numbers** | |

| | |
|---|---|
| • Introduction of Complex number<br>• Baudhayan form of Complex<br>• Addition & Subtraction of Complex Number<br>• Multiplication of Complex numbers | 4 |
| Unit IV: **Enlighten Calculus** | |
| • Introduction to differentiation<br>• Application of derivatives<br>• Introduction to Integration<br>• Application of Integration | 4 |

*Note:* **Some of the theoretical concepts would be dealt with during practice hours.**
**Practical/ Practice Component**            **(15 sessions of 2 hours each= 30 hours)**

The students are expected to demonstrate the application of Vedic Maths: *Sutra* and *Upsutra*
- Conduct workshops under the supervision of the course teacher to spread awareness on the utility of Vedic Mathematics.
- Students may share their experience with the class teacher in the form of audio-video presentations of 15 minutes.
- If required, students can share their experiences in the form of a Project Report.
- Any other Practical/Practice as decided from time to time

**Essential Readings**
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- The Power of Vedic Mathematics with Trigonometry, *Atul Gupta, Jaico Publishing house*.
- Studies in Indian Mathematics and Astronomy, Aditya Kolachana, K. Mahesh, K. Ramasubramanian, *Springer, Singapore*
- Elements of Vedic Mathematics, Udayan S. Patankar, Sunil M. Patankar, TTU Press.
- Vedic Mathematics For All Ages, Vandana Singhal, *Motilal Banarsidas Publishers.*
- Vedic Geometry Course, S. K. Kapoor, *Lotus Press*

**Suggested Readings**
- A Modern Introduction to Ancient Indian Mathematics, T S Bhanumurthy, *Wiley Eastern Limited, New Delhi*
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- Learning Vedic Mathematics, S. K. Kapoor, *Lotus Press Publications*
- Vedic Mathematics Made Easy, Dahaval Bathia, *Jaico Publishing, New Delhi*

**Assessment Method**
Subject to directions from the Examination Branch/University of Delhi from time to time

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